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Ontario Geological Survey
Open File Report 6186

Report of Activities, 2005 Resident Geologist Program

Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Ontario Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre

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Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Ontario Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre

by

P.J. Sangster, D.A. Laidlaw, V.C. Papertzian, K.G. Steele, C.R. Lee, M. Barua and T.R. Carter

2006

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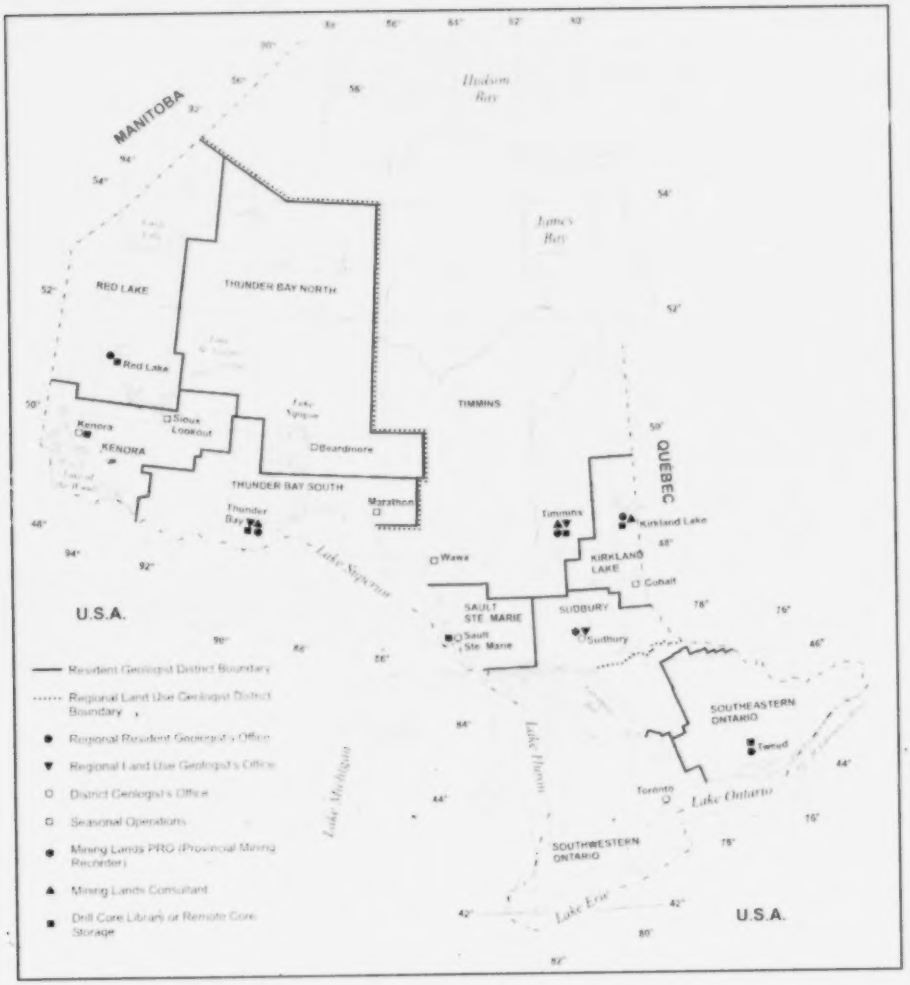

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ONTARIO GEOLOGICAL SURVEY

RESIDENT GEOLOGIST PROGRAM

REPORT OF ACTIVITIES—2005

SOUTHERN ONTARIO
REGIONAL RESIDENT GEOLOGIST REPORT

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Ontario

Ontario Geological Survey
Regional Resident Geologist Program

Southern Ontario Regional Resident Geologist (Southeast Ontario District)—2005

by

P.J. Sangster, D.A. Laidlaw and V.C. Papertzian

2006

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Southern Ontario Regional Resident Geologist (Southeast Ontario District)—2005

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INTRODUCTION

In 2005, production from mines and quarries continued throughout the District within the Grenville Province and in the Paleozoic rocks to the south and east. Exploration for various nonmetallic commodities including dimension stone, vermiculite and wollastonite remained strong. Junior mining companies and prospectors showed a renewed interest in exploring for gold, copper-nickel and platinum group metals. Continued high prices for uranium and molybdenum saw exploration companies and prospectors acquiring and exploring past producers and adjacent properties.

MINING ACTIVITY

During 2005, there were 49 mineral extraction operations in southeastern Ontario, including: 6 industrial mineral operations; 2 trap rock producers; 3 cement producer's quarries; 1 brick producer's quarry; 3 gemstone and mineral specimen sites; and 33 stone quarries. The sole metal producer remained Timminco Limited. The company currently produces magnesium metal from a deposit of high purity dolomitic marble in Ross Township approximately 100 km west of Ottawa. For a complete listing of Mining Activity and locations of operating mines and mills in southeastern Ontario, please refer to Table 1 and Figure 1 respectively.

Table 1. Mining activity in 2005 – Southern Ontario Regional Resident Geologist (Southeast District). Keyed to Figure 1.

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining Activity
1	AECON (formerly Armbro Construction)	Marmora (Limestone)	Limestone is quarried from former Marmoraton minesite for aggregate.
2	Allan Franks Construction Ltd.	Madoc (Limestone)	Limestone has been quarried and crushed since 1991 for road aggregate.
3	Amsen Quarries Ltd.	Harvey (Limestone)	Limestone landscaping stone products.
4	Aqua Rose Quarries	Lyndoch (Gemstones, Mineral specimens)	Quarrying operations for rose quartz, beryl, feldspar, lyndochite, amazonite, cleavlandite, peristerite, columbite, fluorite and bertrandite. Two quarries are in operation: the Beryl Pit which charges a fee for mineral collecting and the Rose Quartz Quarry which produces landscape stone.
5	Arriscraft Corporation (Elgin Quarry)	Bastard (Sandstone)	Potsdam sandstone was quarried for the manufacture of reconstituted sandstone. Raw material was shipped to Cambridge for processing. A new application was found with blocks being quarried and cut into tiles for lining acid tanks.
6	Bancroft Chamber of Commerce (Bear Lake Diggings)	Monmouth (Mineral Specimens)	Fee for collecting site near Wilberforce. Field trips to this site organized by the Bancroft Chamber of Commerce attract on average 40 to 50 participants.

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining Activity
7	Belmont Rose Granite Corp. (Belmont Rose Granite Quarry)	Belmont (Dimension Stone)	Granite is quarried for dimension stone, curbstone, landscaping stone, crushed decorative stone and exposed aggregate.
8	Canada Brick (Russell Quarry)	Russell, Gloucester (Clay Products)	Clay bricks are produced from red shale. In 2005, annual production was 88 000 t of material extracted. The quarry is located in Russell Twp. The brick plant, in Gloucester Twp. produced 44. 246 million brick units.
9	Canada Talc Division , Dynatec Mineral Products Division, (Henderson Mine)	Huntingdon (Talc, Dolomite)	Additional access to ore has been attained by the development of a new mining level (underground) at the Madoc Mine which will allow for the planned increase in production to over 20 000 t per year. Similarly, the completed upgrading and expansion of processing lines at the Marmora processing plant has allowed for the increased volume of ground and micronized talc and dolomite products as well as the processing of other mineral filler products, principally barite. The facility now produces all of their high-end barite filler products for high-end industries located in the United State and South America.
10	Central Ontario Natural Stone (Batty Quarry)	Laxton (Limestone)	Grey, buff and black limestone is produced as flagstone.
11	Cornwall Gravel Company Ltd. (Cornwall Quarry)	Cornwall (Limestone)	Limestone for dimension stone is quarried on demand from the thick upper beds of this construction aggregate quarry. (Cornwall Black marble).
12	Cruickshank Construction Limited	Kingston (Limestone)	The Elginburg Quarry near Kingston produces half a million tonnes of limestone annually. This company has 12 operating quarries throughout eastern Ontario including Green Valley, Kemptville, Brockville, Iroquois, Napanee and Verona. They produce a range of products from fine aggregate to armour stone. Their stone has been used in shoreline protection projects along the St. Lawrence Seaway, including a $3.5 M breakwater and a marina project in Prescott.
13	Danford Construction (Springbrook Road Quarry)	Huntingdon (Limestone)	Limestone is quarried and crushed for road aggregate and specialty concrete (seasonal operation). Annually they produce 150 000 t of limestone and employ a staff of 24.
14	Drain Construction	Dummer (Limestone)	Limestone for use as road aggregate.
15	Drain Construction	Methuen (Granite)	Crushed stone for aggregate.
16	Elite Blue Granite	Chandos (Marble)	Stone is split / guillotined for flagging and landscape stone.
17	Essroc Canada Inc. (Picton Quarry)	Sophiasburg (Cement)	A cement plant and on-site limestone quarry with an annual production of slightly less than 1 000 000 tons. This is one of the largest cement plants in North America and employs 160 people. Essroc has contracts to supply cement for the construction of the new Canadian War Museum in Ottawa and a new call centre being built in Kingston.
18	Floyd Preston Ltd. (Mountain Lake Quarry)	Cavendish (Granite)	Burgandy coloured granite is quarried for use as crushed stone aggregate and decorative stone. The quarry has an aggregate extraction license, with no annual extraction limit. Product is shipped to the company's Mount Albert site serving the Richmond Hill, Newmarket and Aurora markets.
19	Haliburton Stone Works	McClintock, Laxton (Granite and limestone)	A variety of granite and limestone dimensional and landscape stone are produced from 2 quarries.
20	I.K.O. Industries Ltd. (I.K.O. Quarry)	Madoc (Trap Rock)	Since 1991, I.K.O. Industries Ltd. has operated a traprock quarry east of Madoc on the south side of Hwy 7. The quarry is located within a ridge of grey to black, fine-grained, Agglomeratic, metavolcanic rock. The rock is durable and exhibits no undesirable weathering effects. An on-site mill and colouring plant produce roofing granules, which are trucked to the company's asphalt shingle manufacturing plant in Brampton. In addition to roofing granules, stone from the quarry is crushed to produce HL-1 aggregate (asphalt road surfacing mix). The quarry is licensed under the Aggregate Resources Act to produce up to 1Mt per year. A total of 70 people are currently employed at the quarry, mill and colouring plant.
21	International Quartz Ltd.	McClintock (Quartz)	Crushed white quartz is produced on demand for local market.
22	Jeff Parnell Contracting Limited	Galway (Limestone, Granite)	Natural and dimension cut armour stone, rockery stone, garden stone, natural surface steps and natural and dimensional flagstone. Burgandy coloured granite from the site is being tested for decorative stone, landscaping and dimension stone applications.

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining Activity
23.	John Bacher Construction Limited	McClintock (Granite Gneiss)	Building stone, flagging stone, and landscaping stone.
24.	Karson Kartage & Konstruction Ltd. (Clarke Quarry)	Huntley (Limestone)	The quarry produces limestone for use as road aggregate.
25.	LaFarge Canada Inc. (Bath Quarry)	Ernestown (Cement)	A cement plant and on-site limestone quarry with a capacity to produce 1 000 000 t of cement. Silica used in the production of cement is extracted from the company's Potsdam sandstone quarry in Pittsburgh Twp. as well as from recycled foundry sands.
26.	Miller Paving Ltd (Carden Quarry)	Carden (Limestone)	This quarry east of Brechin produces grey limestone for use as aggregate, architectural stone, landscaping/armor stone, asphalt limestone, crushed limestone and manufactured sand. Product from the quarry supplies a growing market in Markham, 90 km to the south.
27.	MRT Aggregate Inc.	Methuen (Aggregate)	Metagabbro is quarried and crushed on site for use as premium aggregate for HL1 purposes. Portable crusher is moved onsite as required. Production began in December 2002. Annual production of 100 000 t is used by Miller Paving and also sold outside the company.
28.	Nelson Windover Quarries (Windover, Buckhorn Quarry)	Harvey (Limestone)	Grey limestone is quarried as a seasonal operation for the production of flagstone.
29.	North Hastings Aggregate Ltd.	Dungannon (Decorative Aggregate)	Multicoloured granite is extracted for use as decorative aggregate.
30.	OMYA (Canada) Inc. (Tatlock Quarry)	Darling (Calcite)	Calcitic marble is mined to produce high purity, fine-grind calcite for fillers with terrazzo chips and landscaping stone as secondary products. Annual production is 250 000 tons and quarry reserves currently stand at over 5 000 000 tons. In 2000, a 5-year expansion program was completed at their quarry and plant located in Perth.
31.	Payne, E.W. (Payne Quarry)	Dummer (Limestone)	Flagstone is produced seasonally from this quarry.
32.	Princess Sodalite Mine	Dungannon (Sodalite)	Decorative stone, landscaping stone, mineral specimens including fee for collecting.
33.	Redstone Quarries	Galway, Harvey, Cavendish (Limestone, Sandstone)	Beige limestone and red sandstone are quarried for weathered landscaping stone and armour stone blocks.
34.	Regis Resources, Inc.	Cavendish (Vermiculite)	Regis Resources began producing vermiculite in June 2004. Proven and probable reserves are 890 000 t at 21.4% vermiculite as well as measured and indicated resources of 380 000 t at 21.4% vermiculite. The mine produces fine, super fine, and micron grades of vermiculite, destined for markets in North America.
35.	Rideauview Contracts Ltd. (Ellisville Quarry)	Rear Leeds & Lansdowne (Sandstone)	Sandstone produced for flagstone, granite blocks and masonry stone.
36.	Rideauview Contracts Ltd. (Pettworth & Renaud Quarries)	Camden (Limestone)	Limestone was quarried for building restoration work in Kingston.
37.	Rideauview Contracts Ltd. (Rideauview Quarry)	Storrington (Sandstone)	Red sandstone is produced for ashlar and flagstone.
38.	Rideauview Contracts Ltd. (Sloan Quarry, Battersea Quarry)	Storrington (Sandstone, Granite)	Cream and red sandstone are quarried for the production of ashlar, flagstone and landscaping stone at the Sloan Quarry. Red granite is quarried at the Battersea Quarry.
39.	Royel Paving	Galway (Granite)	Granite is quarried and crushed onsite for road aggregate.
40.	Senator Stone	Elzevir (Marble)	The quarry began production in 2001. White calcitic marble is quarried seasonally and crushed onsite.
41.	Senator Stone	Faraday (Marble)	The quarry site was brought to mining lease in 2002. (Temagami Pink marble breccia.)
42.	St. Lawrence Cement Inc.	Cramahe	The quarry has been in production since 1959. It produces between 1.9 to 2.1 Mt of

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining Activity
	(Ogden Point Quarry)	(Limestone, Cement)	limestone per year. Crushed stone from the quarry is shipped by lake to the company's cement plant in Mississauga. The quarry employs 20 people.
43	Stone Cottage Inn Ltd. (Attia Quarries)	Harvey (Limestone)	Grey limestone is quarried for dimension stone.
44	Timminco Ltd. (Timminco Metals Quarry)	Ross (Magnesium, Strontium & Calcium metal)	Magnesium is produced from high-purity dolomite mined at this location. Calcium and strontium are produced from purchased limestone. Production rate is 1000 tons of dolomite weekly. The annual production is 6000 tons of magnesium metal and alloys; 400 tons of calcium metal and alloys and 135 tons of strontium metal. The operation employs 240 people and there are reserves for 50 years at the current rates of production.
45	TRT Aggregates Ltd.	Amelıasburgh, Hilliard, Tyendinaga, Thurlow & Richmond (Limestone)	Rough dimension stone blocks, armour stone, flagstone and crushed limestone are produced. Most of the quarries are operated on an as-needed basis.
46	Unimin Canada Ltd. (Blue Mountain Quarry)	Methuen (Nepheline Syenite)	Nepheline syenite is mined from a quarry and processed in 2 mills. Magnetite is produced as a by-product. Production rate is 2500 tons per day. The mine opened in 1955 and employs 152 people.
47	Upper Canada Stone Co. Ltd. (Mephisto Lake quarry)	Cashel , Mayo (Calcitic Marble)	White marble is quarried and sold as crushed marble, landscaping stone, decorative stone and in pre-cast architectural concrete and panels.
48	Upper Canada Stone Co. Ltd. Upper Canada Minerals Inc.	Madoc and Huntingdon (Marble)	Red, pink, white, green, buff, black, blue, chocolate, light buff and light green marble are mined from 8 quarries in the Madoc area. Marble chips (terrazzo), exposed aggregate and landscape stone are produced at the mill.
49	Upper Canada Stone Co. Ltd. Upper Canada Minerals Inc.	Rear of Leeds and Landsdowne (Granite)	Red granite is quarried for armour stone, landscaping, architectural and structural stone from both quarries. (Kingston Red Granite Co. Ltd. (Seeley's Bay Quarry #1 & Seeley's Bay Quarry #2).

*The Granimar Quarries Ltd. quarry was sold by auction in December 2003 and remained inactive throughout 2005.

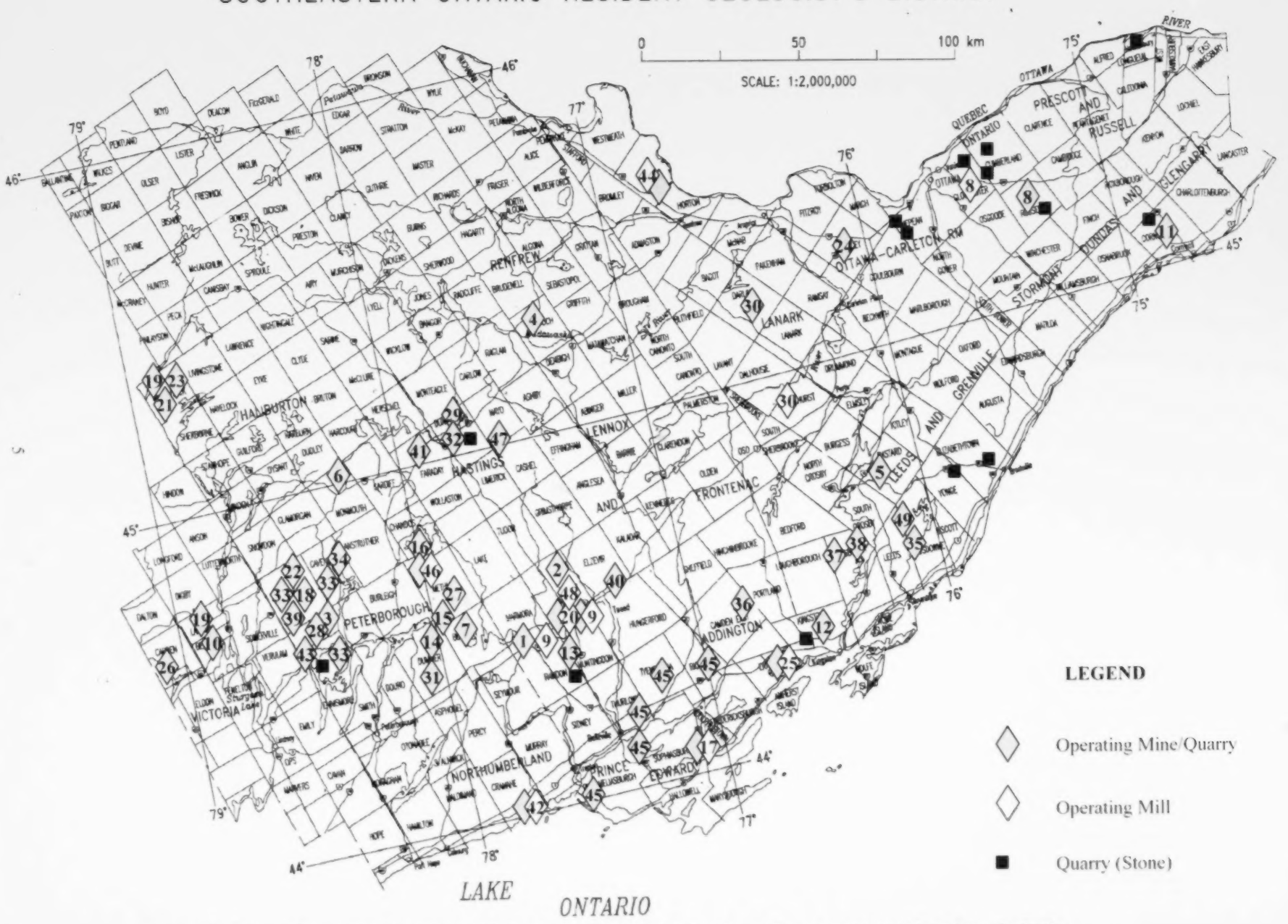
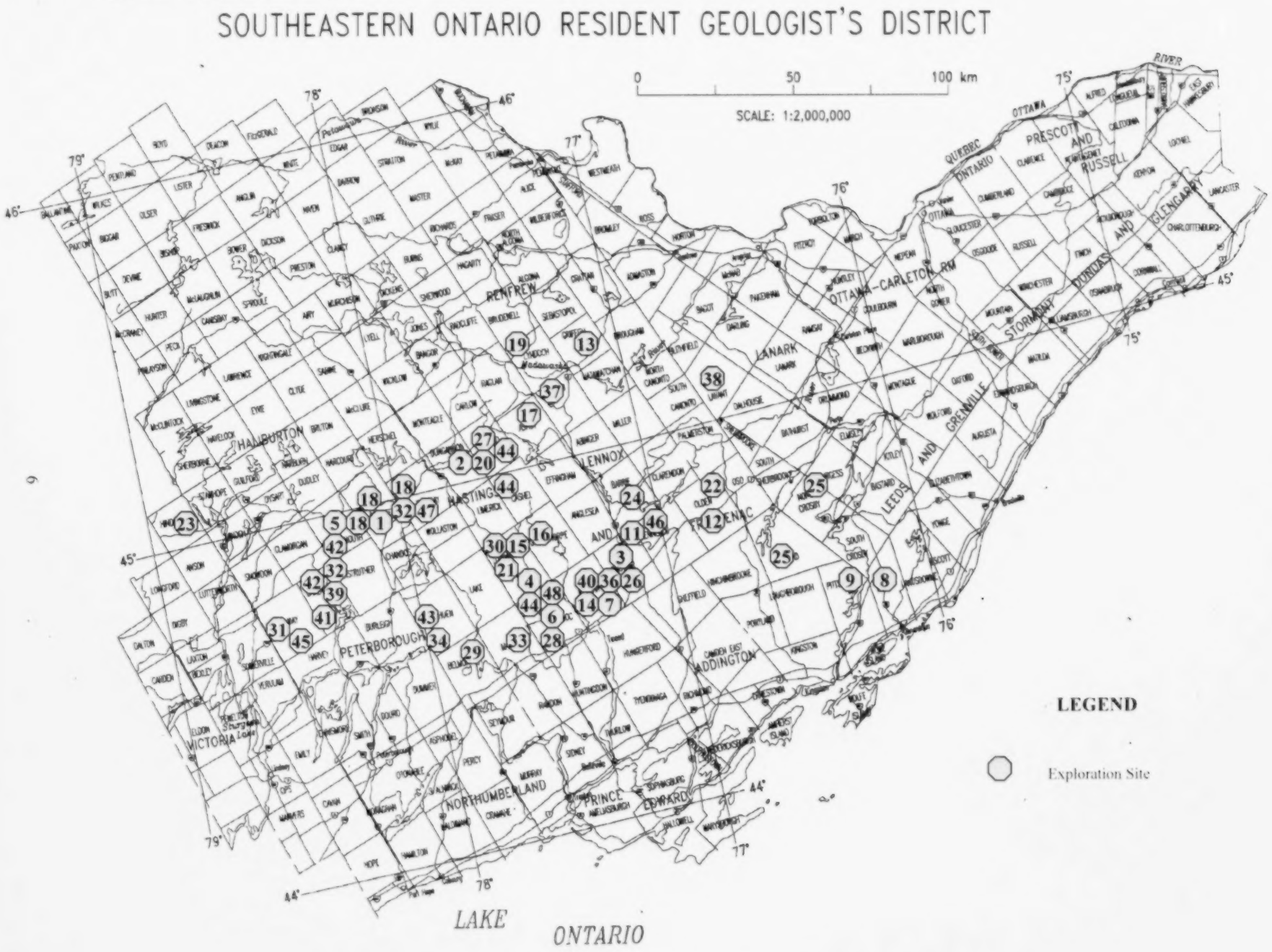


Figure 1. Mining/Quarrying Activity in 2005 - Southeast District, Southern Ontario Regional Resident Geologist

Figure 2. Exploration Activity in 2005- Southeast District, Southern Ontario Regional Resident Geologist



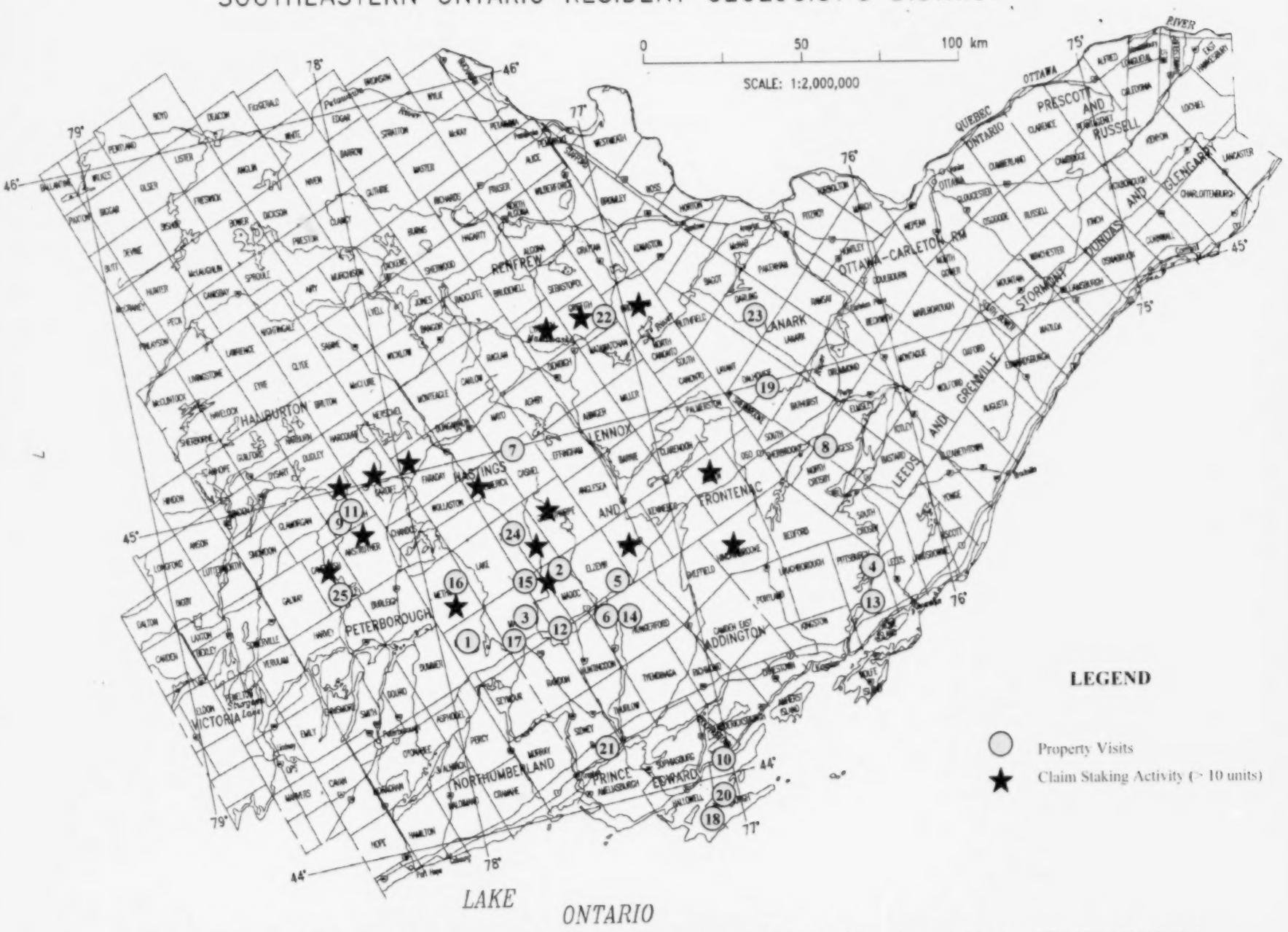


Figure 3. Property Visits and Claim Staking Activity in 2005- Southeast District, Southern Ontario Regional Resident Geologist

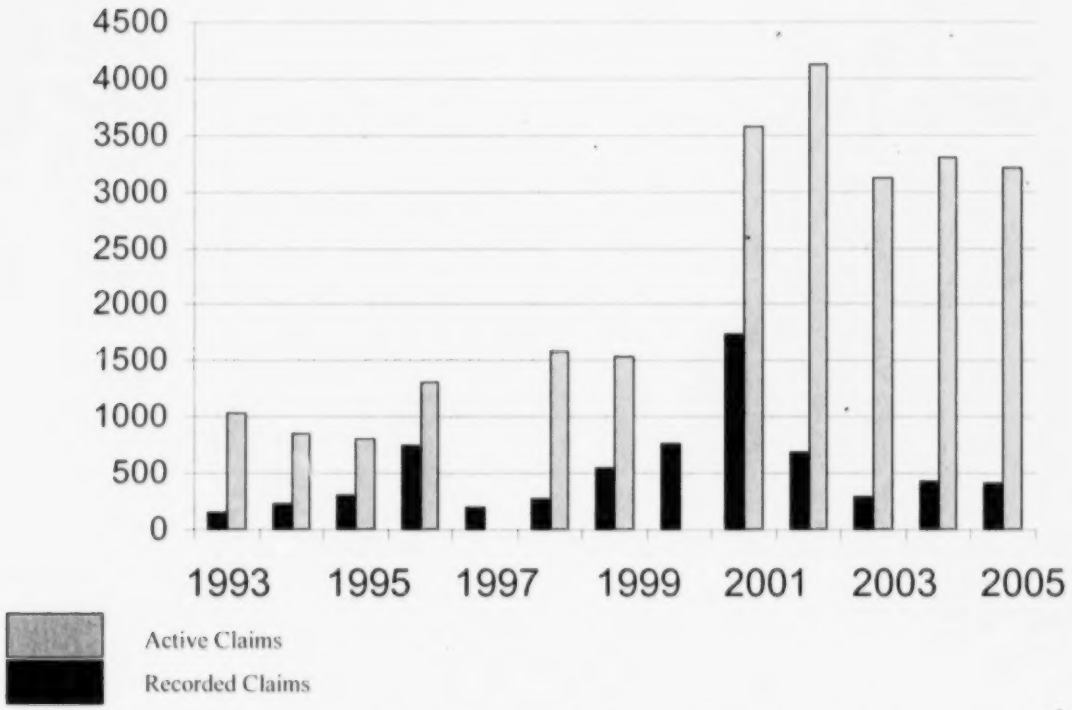


Figure 4. Claim activity in the Southern Regional Resident Geologist (Southeast) District: 1993–2005.

ADVANCED EXPLORATION AND DEVELOPMENT

Canadian Wollastonite–St. Lawrence Deposit

In 2005, Canadian Wollastonite further refined and tested its beneficiation process and flow sheet, completed detailed conceptual engineering of a 25K tpd plant, and had the project properties re-designated for mineral extraction. Canadian Wollastonite will produce a high grade, high aspect wollastonite product, as well as a low Fe diopside byproduct. The company is presently exploring for markets interested in low Fe diopside.

In 2006 the company expects to construct a pilot testing facility to prove the scalability of its new beneficiation process and to provide larger samples of wollastonite and diopside for customer acceptance testing (B. Vasily, Canadian Wollastonite, personal communication, January 2006).

J. Byer and Danford Granite Ltd.–Bulk Sample

In 2005, Danford Granite Ltd. completed a 3300 t bulk sampling program on the J. Byer granite prospect located in Concession XI, Lot 1 in Elzevir Township and Concession XIV, part Lot 30 in Hungerford Township. The sample was taken to test the suitability of granitic gneiss for high specification skid resistant (HL 1, DFC and Superpave) aggregate for use in high traffic provincial and municipal highways.

Work completed on the property included preparation of the test site, drilling, blasting, crushing and screening of the sample and subsequent laboratory testing by the Ontario Ministry of Transportation (MTO), as well as processing of the fine aggregate for liming and use in pavement test sections.

Results of the laboratory testing indicate that the material meets MTO specification criteria for use as aggregate for hot mixed, hot laid, asphaltic concrete and Superpave. Since stone from this location has not previously been used for MTO hot mix paving and is not petrographically similar to an already-approved source, it must be evaluated in a trial section on an MTO contract in order to be listed in the Designated Sources for Materials list. A pavement test section in the Port Perry area is being evaluated by MTO over the next 2 years. MTO requires a one-time fee of $5000 for preliminary investigation and testing of new sources of high quality aggregate (Tweed assessment files, J. Byers, personal communications, 2005, MTO communication, March 2004).

Trigan Resources Inc.–Baseline Environmental Study Hydrochemistry

In November 2005, Trigan Resources Inc. completed an Environmental Baseline Hydrochemistry Study over the company's West Gabbro property. The property consists of 6 unpatented claims in the southwest corner of Methuen Township. Ontario Geological Survey map 1957b shows the claims to be underlain by a small mafic intrusive body.

Previous work by the company has determined that the intrusive is composed primarily of metagabbro. The study included hydrochemical sampling and laboratory analysis of key drainage basin areas of the claim group. Findings and an interpretation of the data were submitted for assessment work and are on file at the Tweed Resident Geologist Program office. Water samples were collected from representative outflow sites and previously completed diamond drill holes.

Unfortunately, several of the holes were discovered to have been vandalized and deliberately contaminated necessitating additional surface sampling. Analyses returned anomalous values for iron, zinc copper and aluminum.

The company plans to develop the site as a source of high quality crushed stone aggregate for HL1. Work to date has included sampling, diamond drilling and geotechnical studies (Tweed RGP office MDI files, assessment files, personal communication 2005, 2006).

Gleeson Rampton Explorations–Muscovite

Gleeson Rampton Explorations advises that the Lavant Muscovite prospect is now available for option. In 2004, Gleeson Rampton Explorations completed beneficiation studies of mini-bulk samples taken from surface outcrops. Beneficiation testing by SGS Lakefield indicated that following flotation and magnetic separation of core sample yielded a 96% pure muscovite product with a 76% overall recovery. SGS Lakefield concluded that the muscovite ore has good potential for making a saleable product. Previous work on the property identified high-grade flake muscovite bearing schist ranging in thickness from 2 to 10 m over a continuous strike length of 1200 m. The total strike length of the prospective zone is over 4000 m. Field and petrographic estimates of the high-grade material range from 30 to 50% muscovite. Crushing and processing of small samples has indicated that the muscovite is relatively coarse, crushes and delaminates easily, is not particularly brittle, has a good aspect ratio and will produce a good concentrate of clean, clear mica (V. Rampton, personal communications, January 2005).

EXPLORATION ACTIVITY

Gold

C. J. LAIDLAW AND T. J. BEESLEY

Prospectors C. J. Laidlaw and T. J. Beesley continued exploration on their claims in the vicinity of the past-producing Craig Mine on Concession III, lots 4 and 5 in Tudor Township, which they had staked in June 2004. Gold was first discovered at the Craig Mine in the late 1800s from shallow surface workings. From 1905-06, the Craig Mine produced 248 ounces of gold from 1850 tons milled at a recovered grade of 0.13 ounces per ton gold. Between 1934 and 1936, Craig Gold Mines Ltd., extended the north and south shafts to 200 and 245 feet respectively, and completed 350 feet of drifting on the 50-foot level and 910 feet on the 225-foot level. Gold occurred in sulphide- bearing quartz veins and stringers cutting mafic volcanic rocks. A total of 23.25 tons of material grading 0.05 ounces per ton gold was shipped to Ottawa for analysis. Between 1969 and 1973,

M.K. Hesslemann diamond drilled 4 vertical holes for a total of 715 feet and in 1981 the New Craig Gold Mines Limited carried out a detailed program of trenching, bulk sampling and examination of the property. Two samples collected from the mine rock dumps in 2004 assayed 0.11 ounces per ton and 0.04 ounces per ton gold (GEO LABS Geosciences Laboratories).

In 2005, with funding from the Ontario Exploration Corporation a multi-element Mobile Metal Ion (MMI) geochemical soil survey was conducted on the claims. The intent of the survey was to test for a northwest striking extension of the Craig Mine gold structure and to perform a systematic reconnaissance soil sample survey to identify gold-bearing structures.

Soil samples were taken from a consistent depth of 20 to 35 cm from surface over a reconnaissance-style grid. More than 150 samples were collected. Results from the reconnaissance soil survey indicated MMI-M metal anomalies for silver, copper, cobalt, nickel, lead and zinc. The prospectors have recommended further exploration to locate the source of the anomalies, including geological mapping, prospecting and follow-up ground magnetic and electromagnetic geophysical surveys (C. J. Laidlaw, personal communication 2005, OGS MDC 18).

D. BAIRD

Prospector Douglas Baird reported results of the MMI survey completed over his 78.9 ha unpatented claim property in Kaladar Township. Gold is the exploration target based on proximity to known gold occurrences and favorable geology. In total, 162 soil samples were collected for analysis with most being taken from a fine to medium sand from the B horizon. Four gold anomalies were indicated. Results are described as intriguing but inconclusive. Further MMI sampling has been recommended (Tweed RGP office files, D. Baird, personal communications 2005).

E. NECZKAR

Prospector Ed Neczkar completed a soil and rock geochemistry survey on his claim block in Marmora Township. The survey was designed as follow-up to previously identified geophysical and geochemical anomalies. The property consists of 150 ha in 8 claim units and is favorably located in proximity to historic and recently discovered gold deposits. Seventy-nine soil samples and 84 rock samples were collected for analysis. Results of MMI analysis of soil samples results were significant. Additional sampling to identify more targets has been recommended (Tweed RGP office files, E. Nezcar, personal communications 2005).

Uranium

EL NINO VENTURES INC.

El Nino Ventures Inc. is exploring 8 uranium properties in the Bancroft area. Reconnaissance geological and scintillometer surveys have been completed on all 8 properties. Detailed exploration of the 2 properties with the largest reported reserves was successful in confirming the historically established grades. Detailed exploration of the remaining 6 properties is underway (El Nino Ventures Inc., press releases, personal communications 2005).

The spot price of uranium has tripled since mid 2003 and there has been a corresponding increase in uranium exploration expenditures in the province from $94 000 in 2004 to $325 000 in 2005.

Uranium was produced from 4 deposits in the Bancroft area where the mineralization is hosted by several rock types including zoned and unzoned pegmatites, sulphide rich siliceous marbles, calc silicate skarns and calcite and pyroxene veins. The mines were brought into production during the period from 1952–56 and by 1964, all 4 had been closed. In 1975, the Faraday Mine (Madawaska) was reopened and production continued until 1982. Total production from the camp was an estimated 10 600 000 tons of ore mined to produce 14 800 000 pounds of U_3O_8.

Uranium mineralization in southeastern Ontario also occurs in calcareous rocks as stratiform, stratabound and meta-pyroxenite-skarn deposits; and in carbonate and pyroxene veins. Ordovician sandstone and dolomite near Ottawa hosts disseminations of an unidentified uranium hydrocarbon.

Molybdenum

A dramatic rise in the price and demand for molybdenum continued throughout 2003 and 2004. Southeastern Ontario has a history of molybdenum production dating to 1915 with most recent production in the 1940s.

In the Bancroft area, 5 deposits in production from 1917 to 1918 produced several thousand pounds of molybdenum from ore grades ranging from 3.85% MoS_2 to 5.8% MoS_2.

The southeastern Ontario deposits have been divided into three classifications including: stratabound-skarn hosted; unconformable to conformable pegmatite hosted and stratiform paragneiss hosted.

There are 45 documented molybdenum occurrences in the Renfrew area including 10 past producers. Reported grades varied from 18% MoS_2 to 0.18% MoS_2. At least 2 of these deposits have known resources. In 2005, prospectors and junior mining companies acquired all available deposits in the Bancroft area including properties to the east in Griffith and Lyndoch townships. Additional prospects and occurrences have been documented in these areas and in the Madoc–Sharbot Lake area.

Nickel-Copper

LIMERICK MINES LIMITED

Limerick Mines Limited holds the right to explore a nickel-copper prospect in Limerick Township under a variety of agreements with surface and mining rights holders and a number of unpatented mining claims. The Bicroft Division of Macassa Mines discovered the prospect in 1961 while investigating magnetic anomalies identified on government airborne magnetic maps. A description of previous work on the property and geology of the site is described in the Report of Activities, 2003, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre. Ontario Geological Survey, Open File Report 6132 (2004). Following an exploration program in 2004 that included diamond drilling, sampling and ground HLEM surveys, the property remained in good standing, but inactive throughout 2005 (Limerick Mines Ltd. personal communication January 2006).

Nickel-Copper-Cobalt–PGM

RANDSBURG INTERNATIONAL GOLD CORPORATION

In January 2005, Randsburg International Gold Corporation announced that net proceeds of a recently closed flow-through offering will be used to fund exploration on several properties including McClintock Township. In 2004, the company reported a significant discovery in the area known as the South Showing. Numerous sulphide mineralized zones were intersected in 6 diamond drill holes; including an 18 m sulphide mineralized intersection assaying 1.09% nickel over 0.45 m. Subsequent surveys included deep penetrating helicopter Time Domain EM (Randsburg International Gold Corporation press releases, website, 2005).

Table 2. Assessment Files Received in the Southern Regional Resident Geologist (Southeast) District in 2005.

Abbreviations

AEM	Airborne electromagnetic survey	Lc	Linecutting
AM	Airborne magnetic survey	Met	Metallurgical testing
ARA	Airborne radiometric survey	OD	Overburden drilling
Beep	Beep Mat survey	ODH	Overburden drill hole(s)
Bulk	Bulk sampling	OMIP	Ontario Mineral Incentive Program
DD	Diamond drilling	OPAP	Ontario Prospectors Assistance Program
DDH	Diamond drill hole(s)	PEM	Pulse electromagnetic survey
DGP	Down-hole geophysics	PGM	Platinum group metals
GC	Geochemical survey	Pr	Prospecting
GEM	Ground electromagnetic survey	RES	Resistivity survey
GL	Geological Survey	Samp	Sampling (other than bulk)
GM	Ground magnetic survey	Seismic	Seismic survey
GRA	Ground radiometric survey	SP	Self-potential survey
Grav	Gravity survey	Str	Stripping
HLEM	Horizontal loop electromagnetic survey	Tr	Trenching
HM	Heavy mineral sampling	UG	Underground exploration/development
IM	Industrial mineral testing and marketing	VLEM	Vertical loop electromagnetic survey
IP	Induced polarization survey	VLFEM	Very low frequency electromagnetic survey

	Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
1.	Bedford (Graphite)	Chris R. Christensen	2003–04	Pr	2.29348	43
2.	Belmont (Ca Marble)	Ulrich H. Kretschmar	2003–05	Pr	2.30088	21
3.	Cardiff, Monmouth (Vermiculite)	Fred T. Archibald	2004	Tr, Geol, IM	2.28673	232.161
4.	Cavendish (Limestone)	Bradley J. Windover	2004	Lc, Tr, Samp	2.28530	136
5.	Cavendish (Vermiculite)	John C. Archibald	2004	Str, Geol, IM	2.28585	135
6.	Denbigh, Lyndoch (Copper, Zinc)	Pelangio Mines Inc.	2004	Lc, PEM	2.28816	8, 44
7.	Elzevir (Granite as Aggregate)	Danford Granite Ltd.	2003-04	Bulk	2.28763	29
8.	Galway (Vermiculite)	Murray K. McGill	2005	Pr, Lc	2.30598	62
9.	Harvey (Limestone)	946606 Ontario Limited	2004	DD	2.28928	22
10.	Hindon (Base Metals)	Yvonne C. Fulton-Bell	2005	Pr	2.30353	11
11.	Hindon (Base Metals)	Yvonne C. Fulton-Bell	2005	Pr	2.30614	12
12.	Kaladar (Gold)	Douglas Baird	2005	GC (MMI)	2.30601	73
13.	Madoc (Hematite)	Merlin Mines Limited	1959	DD	-	154
14.	Marmora (Gold)	Edward Neczkar	2005	GC (MMI)	2.30604	90
15.	Marmora (Gold)	Edward Neczkar/Douglas Baird	2005	GC, Met	2.29557	89
16.	Matawatchan (Gold, BM, Stone)	Roger Brisson/Kenneth Sibley	2003-04	Pr	2.28177	2
17.	Tudor (Gold)	Robert J. Dillman	2004	Geol, GC	2.30794	122
18.	Tudor (Gold)	Robert J. Dillman/James M. Chard	2005	Geol, Samp	2.29870	131
19.	Tudor (Gold)	Timothy J. Beesley	2005	GC (MMI)	2.30995	123

Table 3. Exploration Activity in the Southern Ontario Resident Geologist (Southeast) District in 2005.

Abbreviations

AEM	Airborne electromagnetic survey	Lc	Linecutting
AM	Airborne magnetic survey	Met	Metallurgical testing
ARA	Airborne radiometric survey	OD	Overburden drilling
Beep	Beep Mat survey	ODH	Overburden drill hole(s)
Bulk	Bulk sampling	OMIP	Ontario Mineral Incentive Program
DD	Diamond drilling	OPAP	Ontario Prospectors Assistance Program
DDH	Diamond drill hole(s)	PEM	Pulse electromagnetic survey
DGP	Down-hole geophysics	PGM	Platinum group metals
GC	Geochemical survey	Pr	Prospecting
GEM	Ground electromagnetic survey	RES	Resistivity survey
GL	Geological Survey	Samp	Sampling (other than bulk)
GM	Ground magnetic survey	Seismic	Seismic survey
GRA	Ground radiometric survey	SP	Self-potential survey
Grav	Gravity survey	Str	Stripping
HLEM	Horizontal loop electromagnetic survey	Tr	Trenching
HM	Heavy mineral sampling	UG	Underground exploration/development
IM	Industrial mineral testing and marketing	VLEM	Vertical loop electromagnetic survey
IP	Induced polarization survey	VLFEM	Very low frequency electromagnetic survey

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
1	Archibald, F.T.	Cardiff	Pr
2	Axelson, D.	Dungannon (Marble)	Pr
3	Baird, D.	Kaladar (Au)	GC
4	Beesley, T., Laidlaw, J.	Tudor (Au, BM)	GC
5	Bramham, M.D.	Monmouth (Mineral Specimens)	Pr
6	Butts, N.	Madoc (Marble)	Pr
7	Byer, J.	Elzevir (Dim. Stone)	Pr
8	Canadian Wollastonite	Pittsburgh (Wollastonite)	Pr
9	Canadian Wollastonite	Leeds & Lansdowne (Wollastonite)	Pr
10	Coloured Aggregate	Eastern Ontario (Dim. St.)	Pr
11	Creighton, W.	Kennebec (Au)	Pr
12	Crystal Ray Technology	Olden (Min. Spec.)	Pr
13	Davis, S., Robitaille, R.	Griffith (Mo)	Pr, Samp
14	Despres, J.	Elzevir (Soapstone)	Pr
15	Dillman, R., Chard, J.	Tudor (Au)	Geol, Samp
16	Dillman, R., Chard, J.	Grimsthorpe (Building Stone)	IM
17	Dubblestein, A.	Ashby (Marble)	Pr
18	El Nino Ventures Inc.	Monmouth, Faraday, Cardiff (U)	Str, Geol, Samp, GRA
19	Farmery, D.	Lyndoch (Min. Spec.)	Pr
20	Floyd Preston Limited	Mayo (Marble)	Pr
21	Forget, M.	Tudor (PGE, Au)	Pr
22	Frontenac Ventures Corp.	Olden	Pr
23	Fulton-Bell, Y.	Hindon (BM)	Pr
24	Glanfield, M.	Barrie (Au)	Pr
25	Graphite Mountain Inc.	North Burgess, Bedford (Graphite)	Str, Pr
26	Guillet R.	Kaladar (Mica)	Pr, Samp
27	Hanes, D.	Mayo (Fe)	Pr
28	IKO Industries Ltd.	Madoc (Trap Rock)	Pr
29	Kretschmar, U.	Belmont (Marble)	Pr

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
30	Kriens, P.	Tudor	Pr
31	McGill, M.	Galway (Vermiculite)	Pr, Phys
32	Meek, D.	Anstruther, Burleigh, Cardiff, Cavendish	Pr
33	Neczkar, E.	Marmora (Au)	GC
34	Norway Asphalt Limited	Methuen (Granite)	Pr
35	OMYA (Canada) Inc.	SE Ontario (Marble)	Pr
36	Palu-Corbelli Corporation	Kaladar (Dim. St.)	Pr
37	Pelangio Mines Inc.	Denbigh, Lyndoch (BM)	
38	Rampton, V.N.	Lavant (Mica)	Pr, Samp
39	Regis Resources Inc.	Cavendish (Vermiculite)	Pr, Samp
40	Rich, K.	Elzevir (Soapstone)	Pr
41	Ross, D., Jones, G.	Cavendish (Min. Spec.)	Pr
42	Smerchanski, R.	Cavendish, Monmouth (Mica)	Pr
43	Trigan Resources Inc.	Methuen (Gabbro as Aggregate)	DD, IM
44	Upper Canada Stone	Mayo, Cashel, Madoc (Marble)	Pr
45	Veeley, H.	Kennebec (Au, BM)	Pr, samp
46	Webster, D.N.	Galway (Mica, REE, Diamonds)	Pr
47	Whotton, J.	Faraday (Au)	Pr
48	Young, R.	Madoc (Talc)	Pr

RESIDENT GEOLOGIST PROGRAM (RGP) STAFF AND ACTIVITIES

During 2005, staff of the Southern Ontario Regional Resident Geologist (Southeast) office included P.J. Sangster, Regional Resident Geologist; V.C. Papertzian, Southeast District Geologist and D.A. Laidlaw, Southeast District Support Geologist. Summer Experience Program students E. Laidlaw and S. Courneyea provided summer field season support to the Tweed RGP office. A significant accomplishment of the Summer Experience Program was the successful conversion of all Tweed RGP office slides and photos to digital format.

After over 25 years of service, Chris Papertzian, District Geologist Southeast Ontario retired from the Ontario Public Service (OPS) on November 30, 2005. Debbie Laidlaw, District Support Geologist, will be acting District Geologist in a training and development assignment until March 31, 2006.

Southern Ontario Prospector's Association (SOPA)

During 2005, the Tweed Regional Resident Geologist Office (RRGO) continued regular liaison with the Southern Ontario Prospector's Association (SOPA) to provide improved service to the client group. During the year the Tweed RRGO organized a session to provide SOPA members with an update on industrial mineral activities in southern Ontario, and program planning within the Ontario Geological Survey. Guest speakers included staff from the OGS Precambrian Geoscience Section and the Sedimentary Geoscience Section. Tweed RRGO staff provided copies of the OEC grant program applications to interested local clients.

Staff from the Tweed RRGO and SOPA representatives presented a cooperative booth highlighting mineral resources at the 2005 Bancroft Gemboree. The event recorded over 16 000 attendees.

Table 4. Field visits completed in 2005 – Southern Ontario Regional Resident Geologist (Southeast). Field visits within the District are keyed to Figure 2.

No.	Property/Operation	Commodity
1	Belmont Rose Quarry, Belmont Tp.	Granite
2	Bannockburn Gold Mine, Madoc Tp.	Gold
3	Brucitic marble, Marmora Tp.	Scientific interest
4	Canadian Wollastonite, Pittsburgh Tp.	Wollastonite
5	Carbroc quarry, Elzevir Tp.	Miller filler - dolomite
6	Champlain Marble, Tweed Marble Quarry, Hungerford Tp.	Marble dimension stone
7	FPI, Quarry, Cashel Tp.	Marble
8	Graphite Mountain prospect, Burgess Tp.	Graphite
9	Greenmantle Farm, Monmouth Tp.	Mineral specimens – feldspar, amphibole
10	Gretna #1 quarry, Fredricksburgh Tp.	Limestone - Scientific interest
11	Guillet Prospect, Monmouth Tp. – core retrieval	Nepheline, Monmouthite - Scientific interest
12	Hwy. 7 slate, Madoc Tp.	Scientific interest
13	Kingston stone, Pittsburgh Tp.	Dimension stone
14	Lajoie quarry, Hungerford Tp.	Limestone – past producer
15	Lydia Diamond Core retrieval, Madoc Tp.	Scientific Interest
16	MRT, Trigan Resources pit, Methuen Tp.	Trap rock
17	Marmora quarry, Marmora Tp.	Lithographic limestone – past producer
18	Milford quarry, Hallowell Tp.	Limestone - Scientific interest
19	Playfair minesite, Dalhousie Tp.	Iron – past producer
20	Quinte Conservation Centre, Belleville	Education
21	Quinte Conservation Centre, Picton	Education
22	Spain Mine, Griffith Tp.	Past producer, prospect, Molybdenum
23	Tatlock quarry, Darling Tp.	Marble, Mineral filler
24	Tudor Gabbro, Tudor Tp.	Dimension stone
25	Vermiculite Canada, Regis Resources, Cavendish Tp.	Vermiculite
	Industrial Minerals Investigations Outside of SE District	
26	Burkendale quarry, Franklin Tp.	Granite flagstone
27	Hwy. 144, Muldrew Tp.	Dimension stone, pinite
28	Hwy 144, Noble Tp.	Dimension Stone, diabase
29	Hwy 69, Parry Sound	Mafic dyke, scientific interest
30	Kirkland Lake -Cobalt	Kimberlites, Lamprophyre scientific interest
31	Luzenac Plant and quarry, Penhorwood Tp.	Talc
32	Lount carbonate Prospect, Lount Tp.	Marble
33	Warford slate, Fallon Tp.	Dimension stone, slate

Table 5 below provides a 5-year summary of program activity and Table 6 lists new publications added to the Tweed RGP office technical library during 2005.

Table 5. Program Activity Statistics for 2005–Southern Ontario Regional Resident Geologist (Southeast).

Activity	2001	2002	2003	2004	2005
Field Investigations/Property Visits	44	45	44	58	33
Field Trips Given/Field Guide Written	3	3	2	1	1
MDI Records Revised	906	481	470	469	487
MMAH Presentations	4	2	4	2	2
Clients Visits to Tweed RGP Office	496	428	470	461	387
Drill Core Library Users	58	17	26	142	48
Client Communications/Interactions (Presentations/Poster Sessions)	3000+	2550	2550	>3000	>3000
Client Inquiries (Telephone/E-mail/Mail)	2668	2400	2461	2498	2247
OGS Publications Sold	89	108	62	84	144
Prospector's Licenses Sold	15	14	20	14	7
Claim/Line Tags Sold	742	131	27	293	256

Table 6. Library Acquisitions in 2005–Southern Ontario Regional Resident Geologist (Southeast) District (OGS publications of particular interest to the Southeast Ontario District are shown in bold).

Title	Author	Type and Year of Publication
Canadian & American Mines Handbook 2005-2006	Giancola, D. (ed.)	Business Information Group, Toronto, 624p. 2005
Base Metal (Cu-Pb-Zn) Mineralization in the Kingdom of Saudi Arabia	Sangster, D.F., and Abdulhay, G.J.S.	Saudi Geological Survey, Jeddah, 144p. 2005
Canada's Northern Diamonds – from rocks to riches	Meredith, G.	Northern Ink Lignited, Yellowknife, 45p. 2002
Industrial Minerals 2005 – the Seventeenth Annual Canadian Conference on Markets for Industrial Minerals		Proceedings, Blendon Information Services, Toronto, 2005
Careers in Mining – A handbook compiled by the Muskoka Nipissing Parry Sound Local Training and Adjustment Board		MITAC Canada, North Bay, 75p. 2005
Iron Mining at Bessemer – 1899-1914, The Hand of Father Time	Hanes, D.	Highway Book Shop, Cobalt, 203p. 2002
Penelope the Miner	Rhodes, L.C., and Shkrabek, G. (illus)	Trafford Publishing, Victoria, 32p. 2004
Looking Back Porcupine Goldfields Ontario	Bachmann, K.	Looking Back Press, St. Catharines, 128p. 2003
Overview of Trends in Canadian mineral exploration	Minerals and Metals Sector	Natural Resources Canada, Ottawa, 161p. 2004
Diamond exploration techniques emphasizing indicator mineral geochemistry and Canadian examples	Fipke, C.E., Gurney, J.J., and Moore, R.O.	Geological Survey of Canada, Bulletin 423, 86p. 1995
Dimension Stone Design Manual, Version 6		Marble Institute of America, Cleveland, Ohio, 358p. 2003
2005 Membership Directory		Marble Institute of America, Cleveland, Ohio, 167p. 2005
Application of GeoData Analysis System (GeoDAS) to Mineral Exploration in Ontario	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release – Data 171, 1 CD-ROM, 2005
Three Dimensional Surficial Geochemistry	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release – Data 164, 1 CD-ROM, 2005
Use of a Soil Gas Hydrocarbon Technique to Differentiate Barren Graphitic and Sulphidic Conductors from Ore-Bearing Conductors	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release – Data 165, 1 CD-ROM, 2005

Title	Author	Type and Year of Publication
Gedex Airborne Gravity Gradiometer (AGG) System	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release – Data 166, 1 CD-ROM, 2005
Three Dimenstional Geochemistry in the Abitibi Development of Geochemical Exploration Methods	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release – Data 168, 1 CD-ROM, 2005
Development of a High Bandwidth Frequency Domain EM System	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release – Data 169, 1 CD-ROM, 2005
Geochemical Detection of Disseminated Palladium Mineralization of Ontario	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release – Data 170, 1 CD-ROM, 2005
Development of Methods and Technology for the Discovery of New Resources Around Existing Mine Infrastructure	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release – Data 172, 1 CD-ROM, 2005
Geochemistry of Exhalites and Graphitic Argillites Near VMS and Gold Deposits	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release – Data 173, 1 CD-ROM, 2005
Downhole Seismic Imaging Method: A New Tool for Deep Mineral Exploration	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release – Data 175, 1 CD-ROM, 2005
Development and Demonstration of Novel Field-Portable Sample Preparation Methods for On-Site Geochemical Analysis	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release – Data 176, 1 CD-ROM, 2005
Development of a Relational Physical Rock Property Database	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release – Data 179, 1 CD-ROM, 2005
Nonferrous Metals Outlook: December 2004	Minerals and Metals Sector	Natural Resources Canada, Ottawa, 42p, 2005
Quaternary geology of the Brampton area	Karrow, P.F.	Ontario Geological Survey, Report 257, 59p, 2005. Accompanied by Map 2223
Quaternary geology of the Brampton area	Karrow, P.F., and Easton, J.	Ontario Geological Survey, Map 2223, scale 1:50 000, 2005
Summary of Field Work and Other Activities 2005	**Baker, C.L., Debicki, E.J., Kelly, R.I., Ayer, J.A., Easton, R.M., and Madon, Z.B.**	**Ontario Geological Survey, Open File Report 6172, 301p, 2005**
Sampling Lamprophyre Dikes for Diamonds: Discover Abitibi Initiative	Grabowski, G.P.B., and Wilson, A.C.	Ontario Geological Survey, Open File Report 6170, 262p, 2005
Geological Compilation of the Central Abitibi Greenstone Belt: Kapuskasing Structural Zone to the Quebec Border	Ayer, J.A., Berger, B.R., Hall, L.A.F., Houle, M.G., Johns, G.W., Josey, S., Madon, Z., Rainsford, D., Trowell, N.F., and Vaillancourt, C.	Ontario Geological Survey, Preliminary Map 3565, scale 1:250 000, 2005
Report of Activities 2004, Resident Geologist Program, Red Lake Regional Resident Geologist Report: Red Lake and Kenora Districts	Lichtblau, A., Hinz, P., Ravnaas, C., Storey, C.C., Kosloski, L., Raoul, A., and Gula, R.	Ontario Geological Survey, Open File Report 6146, 97p, 2005
Report of Activities 2004, Resident Geologist Program, Thunder Bay North Regional Resident Geologist Report: Thunder Bay North District	Smyk, M., White, G.D., Magee, A., and Komar, C.	Ontario Geological Survey, Open File Report 6147, 37p, 2005
Report of Activities 2004, Resident Geologist Program, Thunder Bay South Regional Resident Geologist Report: Thunder Bay South District	Schnieders, B.R., Scott, J.F., Magee, M.A., Muir, T.L., and Komar, C.	Ontario Geological Survey, Open File Report 6148, 46p, 2005
Report of Activities 2004, Resident Geologist Program, Timmins Regional Resident Geologist Report: Timmins and Sault Ste. Marie Districts	Atkinson, B.T., Hailstone, M., Scim, G.Wm., Wilson, A.C., Draper, D.M., Bulman, V., and Pace, A.	Ontario Geological Survey, Open File Report 6149, 93p, 2005
Report of Activities 2004, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake District	Meyer, G., Grabowski, G.P.B., Guindon, D.L., and Chaloux, E.C.	Ontario Geological Survey, Open File Report 6150, 56p, 2005
Report of Activities 2004, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Sudbury District	Cosec, M., Farrow, D., and Gaudreau, M.	Ontario Geological Survey, Open File Report 6151, 41p, 2005
Report of Activities 2004, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Ontario Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre	**Sangster, P.J., Papertzian, V.C., Steele, K.G., Lee, C.R., Barua, M., Laidlaw, D.A., and Carter, T.R.**	**Ontario Geological Survey, Open File Report 6152, 77p, 2005**

Title	Author	Type and Year of Publication
Report of Activities 2004, Resident Geologist Program, Regional Land Use Geologist Report: Northwestern, Northeastern and Southern Ontario Regions	**Debicki, R.L., Drost, A.P., Lichtblau, A.F., Fraser, R.J., and Rowell, D.J.**	**Ontario Geological Survey, Open File Report 6153, 37p, 2005**
Eabametoong First Nation glossary of geological and mining-related terms	Eabametoong First Nation and Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Paper 170, 81p, 2004
Overview of Results from the Greenstone Architecture Project: Discover Abitibi Initiative	Ayer, J.A., Thurston, P.C., Bateman, R., Dubé, B., Gibson, H.L., Hamilton, M.A., Hathway, B., Hocker, S.M., Houlé, M.G., Hudak, G., Ispolatov, V.O., Lafrance, B., Lesher, C.M., MacDonald, P.J., Péloquin, A.S., Piercey, S.J., Reed, L.E., and Thompson, P.H.	Ontario Geological Survey, Open File Report 6154, 146p, 2005. Accompanied by Chart A, Figures 1 and 2
Gravity and Magnetic Three-Dimensional (3D) Modelling: Discover Abitibi Initiative	Reed, L.E.	Ontario Geological Survey, Open File Report 6163, 40p, 2005. Accompanied by Charts A, B, C, D
Two-Dimensional (2D) Reflection Seismic Surveying in the Timmins-Kirkland Lake Area, Northern Ontario; Acquisition, Processing, Interpretation: Discover Abitibi Initiative	Reed, L.E., Snyder, D.B., and Salisbury, M.H.	Ontario Geological Survey, Open File Report 6169, 96p, 2005. Accompanied by 10 back pocket plots.
Cherts of Southern Ontario	Eley, B.E., and Von Bitter, P.H.	Royal Ontario Museum, Publications in Archaeology, Toronto, 51p, 1989
Indiana Limestone Handbook, 20th Edition		Indiana Limestone Institute of America, Inc., Bedford, Indiana, 140p, 1998

PROPERTY EXAMINATIONS

Mafic and Ultramafic Dikes Reconnaissance

In conjunction with the systematic revision of the Mineral Deposit Inventory (MDI) files (OGS 2004), mafic and ultramafic dikes have been identified for follow-up field inspections to investigate their economic potential. A dike in Marmora Township referenced in Limestone Industries of Ontario, Volume 2 as a green and black dike of talcose rock cutting buff-coloured brucitic marble was selected for investigation. The dike intrudes Grenville marble in a quarry located in Concession X, Lot 14 in Marmora Township: MDI31C12SE00113; NAD83, 292749E, 4935193N.

In August 2005, the District Support Geologist and summer students visited the site and photographed and sampled the dike. Access to the quarry is obtained by travelling 6.25 km north on the Deloro Road from Highway 7,and then proceeding on a bush road east of the Deloro Road which turns left at a fork in the road to follow along the bank of the Moira River.

The dike is well exposed in 2 locations. The first exposure, striking 130° and dipping 45° NE, is black and fine-grained, while the second exposure located approximately 10 m to the northeast is highly fractured, 1m wide, and black with inclusions of light coloured marble. Calcite and minor pyrite are present and green serpentine gives the dike a waxy appearance. The marble adjacent to the dike contains tremolite and brucite, as well as minor pyrite. A sample of the dike was sent to the OGS Geosciences Laboratory for ICP analysis. The results did not show enrichment in Ni, Cr or rare earth elements, however the analysis for lithium was greater than 60 ppm.

Dike samples taken from the Vardy Lake kimberlite, the Picton kimberlite and a peridotite dike located in Methuen Township were also sent to the lab for ICP analysis. The dike in Methuen Township was sampled in 2002 and is located in Concession XII, Lot 13; Zone 17, 736752E 4944377N, NAD 27; MDI31D09NE00031, near Unimin's nepheline syenite deposit. A thin section of the dike was described in the 1960 Ontario Department of Mines Annual Report as a peridotite dike containing altered olivine and pyroxene with accessory green spinel and magnetite.

The ICP results from the 2 kimberlite dikes are similar to results published in a 1984 research paper by R.L. Barnett et al, with the exception of cobalt and strontium. Recent analyses for Co and Sr place the samples well within the kimberlite range compared to the 1984 results, which recorded Co and Sr values higher than those found in most kimberlites. Normalized rare earth element diagrams have been plotted for the dikes. The dikes in Marmora and Methuen townships plotted similarly, as generally flat lines and unlike the kimberlite plots, which depicted elevated La, Ce, Pr, Nd, Sm, Eu, and Gd. The Vardy Lake kimberlite had higher values for all rare earth elements compared to the other dikes.

Trigan Resources–MRT Quarry

In August 2005, the Regional Resident Geologist visited the Trigan Resources MRT quarry located on Concession III, Lot 4 in Methuen Township. The quarry is accessed via regional roads 47 and 46, and is situated approximately 26 km north from the village of Havelock.

MRT is part of the Miller Group, a diversified Canadian company that provides public and private sectors with road construction, paving, road rehabilitation and a variety of other services.

Trap rock is blasted from a small open pit and trucked to the surface where it is crushed, sorted and stockpiled onsite for use as premium aggregate for HL1. The rock is a uniform dark green, medium grained, metagabbro. It contains no visibly apparent sulphides or other deleterious minerals. Portable crushers are moved onsite as required.

Production began in December 2002 with annual production totalling an estimated 100 000 t. The product is used by Miller Paving and also sold outside the company. This was the first visit Tweed RRGO staff had made to the quarry. Samples were collected and the site was photographed and located using GPS. Details will be added to the Mineral Deposit Inventory database (Personal observations, Tweed RRGO assessment files, Tweed MDI database).

Bramham Greenmantle Farm–Monmouth Township

In August 2005, the Resident Geologist and R. Denomme, Provincial Mining Recorder, visited the Bramham Greenmantle Farm Property near Wilberforce. The property is held partly as an unpatented mining claim and partly as additional private lands surrounding the claim. Access to the property is via the Essonville Road located approximately 3 km west of the village of Wilberforce.

The Bramhams, retired teachers and mineral collectors, recently discovered a new mineral occurrence on Lots 24 – 25, Con XIII, Monmouth Township, near their home. On the day of the visit, the claim holders provided a guided ATV tour of the site.

The Bramhams preserve the site in its pristine condition by offering guided eco-tours of the site and do not allow sampling. To date there has been no detailed mapping or study of the site and given the strong conservationist convictions of the property holders it is unlikely that any stripping to better expose the occurrence or sampling to complete analyses will be done. They do not wish to turn the site into a fee for collecting operation like the nearby Bear Lake Diggings.

Geology Map 2174 of Monmouth Township shows the area to be underlain by paragneiss–amphibolite group rocks, more specifically quartzite. The claims are largely covered by mature hardwood forest. Bedrock is exposed only near tops of ridges, beds of ATV trails and in a dry streambed.

Being unable to remove moss or debris, or collect samples limits the ability to examine and understand the exposures, however, spectacular well-formed, blocky, white orthoclase crystals in narrow crevices in the bedrock were observed. The size and sharpness of the crystals are impressive. The crevices seemed to have been formed from dissolution of calcite from narrow dykes or linear features. Hornblende crystals of lesser size but equal sharpness occur with the feldspar. Elsewhere on the claims, it appears that calcite lenses have been eroded to release piles of coin-sized fluorrichterite crystals. Fluorrichterite is a rare amphibole, only officially recognized since 1996 and only previously documented in one other location. Apatite, calcite, quartz, tremolite and actinolite crystals were also identified. The owners mentioned the occurrence of caves nearby, but these were not visited due to time constraints.

The site is worthy of further documentation and scientific investigation. Discussion with the owners will be undertaken to see how this can best be completed while respecting their desire to preserve the occurrences. Details of the visit will be added to the Tweed RRGO Mineral Deposit Inventory database.

Playfair Iron Mine

On April 21, 2005, the District Geologist accompanied D. Cranston, Mines Group, on an inspection of the past-producing Playfair iron minesite located in Concession IV, Lot 1in Dalhousie Township, Lanark County. The inspection was in response to public inquiries concerning the sale of the surface rights over the property. On the day of the inspection, surface expressions of the South trench and shafts 2, 3, 4, 5E and 6E were easily located.

From 1866-1871, 11 000 tons of hematite ore from the mine was shipped to the U.S. An additional 80 tons of ore was shipped by the Canadian Union Iron Mines Corp. in 1918.

The deposit consisted of high grade massive hematite associated with pyrite and abundant tremolite in dolomitic marble. One main zone and two smaller NE trending lenses extended over 1600 feet and up to 9 feet in width. The ore assayed up to 57.6% iron.

Mining occurred from open cuts, pits and 7 shafts on the property. The deepest shaft was reported to be 100 feet deep (shaft # 4). The underground drifts and the last 60 feet of the shaft were reported to be in hematite.

Shafts number 1 through 3 measured approximately 78, 75 and 24 feet deep respectively. The longest trench was listed as approximately 540 feet long. Surface workings cover an area of 1600 feet by 20 feet.

The crown pillar is small (3 m wide by 30 m long) and the stopes below appear to have completely caved in to fill the voids to the base of the crown pillar. Failure of all or part of the crown pillar is not likely to result in significant ground movement. As a result, any hazard related to crown pillar failure is thought to have been minimized.

The municipality of Lanark Highlands has proposed an Official Plan Amendment to remove the mining hazard from the OP and schedule. MNDM believes the hazard designation should remain since there are still restrictions as to where one can build on this property. Development of the land with building structures such as houses, garages, barns, sheds, etc. should be restricted within a radial distance of 25 m of the center of Shaft 4, or within 15 m south from the center line of the main trench.

Monitoring, in the form of periodic visual inspections of the property near the former workings is recommended as well as appropriate signage indicating the presence of mine workings.

A subsequent report completed by Trow Associates Inc. on behalf of the new surface rights owner made the following conclusions:

- All of the open shafts have been adequately filled and no longer present a fall hazard.
- All major trenches on the site have been adequately back filled and sloped and no longer present a hazard.

The surface rights of the property were sold through the following chain of events:

- The surface rights were donated to a charitable organization, which was found to be misusing funds.
- The Attorney General's Office seized the property in question and contacted MNDM concerning rehabilitation of the property.
- The AGO obtained the name and addresses of the owners of the mineral rights.
- After 14 months of no response, the property was put up for sale and ultimately, the surface rights for 7 acres, which encompassed the Playfair Iron Mine, were sold for $2.00.

A private residence has now been built on the site and any remaining mineral resource has effectively been sterilized.

RECOMMENDATIONS FOR EXPLORATION

Southern Ontario Stone

Southern Ontario is a major producer of stone, including dolostone, gneiss, granite, limestone, sandstone, marble and trap rock for use as mineral filler, dimension stone, landscape stone and crushed stone aggregate. Most crushed stone comes from Paleozoic limestone and dolostone. In 2004, the last year for which production figures are available, Ontario's stone production was valued at $563 M. Most of this production came from Southern Ontario.

The following recommendations focus on commodities with identified market potential as well as favourable geology. Exploration for new sources of the following stone is recommended:

Lithographic Limestone

The lithographic printing process was invented by Alois Senefelder in 1798 in Austria. By 1848, the process had been refined to the point that it was possible to print 10 000 sheets per hour. The onset of World War I curtailed the importation of stone from Germany and provided renewed opportunity for the development of North American resources. The quarries operated for only a short period, however, as the advent of metal engraving replaced lithographic stone in providing good quality commercial printing at lower cost.

Historically, many types of limestone have been used in lithography, but the world's best lithographic stone continues to come from quarries near the town of Solnhofen in the Jura Mountains of Bavaria. These deposits of Jurassic-age limestone are superior because their fine granularity and chemical purity produce stable and consistent reactions in the process of drawing and printing. Vast quantities of these stones, cut and prepared in a variety of sizes, were shipped to the United States during the 19th century for use in commercial lithography. In the 1890s several quarries on the eastern shore of Crowe Lake in the vicinity of the village of Marmora saw significant production of a lithographic limestone reported to be of similar quality, (lots 6-9, Con III in Marmora Township). The stone was successfully extracted from several beds varying in colour from dark cream to grey and dark blue and in thickness from 25 to 75cm. In 1902, W.G. Miller defined lithographic limestone as,

> "fine in grain, of a homogenous texture, not too dark in colour, and free from quartz and pyrite. It should have sufficient porosity to absorb ink and be soft enough to be worked readily with the engraver's tool."

Likewise, slabs must be durable enough to withstand the pressures of the printing process. Sample slabs for testing should be a minimum of 25cm x 35cm with a thickness of 5 – 9cm.

Today there is a healthy niche market for lithographic stone. The resource is limited and the stone commands a high price for fine arts and artisan printer applications.

Beds of lithographic limestone have been noted in the Gull River Formation from Kingston to Rama Township near Orillia. Essentially, there has been no evaluation of Ontario limestone for lithographic applications for over a century. Examination of operating flagstone limestone quarries, past producers and documented occurrences in southeastern Ontario is recommended. Stone from quarries where extraction methods include blasting will not be suitable.

Magnetite in Southeastern Ontario

Iron ore was mined on a small scale from numerous contact metasomatic iron deposits throughout eastern Ontario between the mid to late 19th and early 20th centuries. High-grade magnetite was produced from a number of low tonnage deposits including the Bessemer, Blairton, and Coe Hill mines. Historical data indicates that a number of these deposits have remaining resources.

In 1949, an airborne magnetometer survey flown jointly by the Ontario Department of Mines and the Geological Survey of Canada led to the discovery of the Marmoraton magnetite deposit. The deposit in Marmora Township, was owned by the Bethlehem Steel Corporation and was in production from 1951 to 1978. During this time the mine produced a total of 27 966 762 tons of ore with an average total iron content of 42.8% (MDI31C05NE00014).

The Calabogie deposit located in Bagot Township was estimated in the 1950s by Algoma Steel Company to contain 27.2 million tons of ore grading 22.28% Fe. The orebody was reported to be 2739 feet long and 145 feet wide and recoverable by open pit mining. This deposit has not been brought into production. Historical files were donated by the Algoma Steel Company to the Resident Geologist Program and have been integrated into the Mineral Deposit Inventory database in Tweed. The files related to the Calabogie deposit include general evaluations, pilot plant testing, preliminary report of ore estimates and mill test results, open pit sections, diamond drill hole cross-sections and estimated mining reserve calculations (MDI31F07SE00009).

The Tomclid Magnetite mine in South Canonto Township was originally mined in 1977 by TMF Resources for use as high-density aggregate in concrete containment shields for nuclear reactors and in road metal. Inactive since 1988, production was re-started in late 1997 by Tomclid Iron Mines Ltd., when 12 000 t of 25% magnetite were extracted to meet a contract with Ontario Hydro. Operations have continued on an as-needed basis, currently by Coloured Aggregates Inc. The main magnetite zone contains an estimated 3 Mt of ore averaging 40% Fe (MP158, p355, MDI31F02SW00032).

Less common in southeastern Ontario than the contact metasomatic iron deposit model, but also an important deposit type, is iron-titanium mineralization hosted by intrusive rocks. The Newboro prospect, an example of this type of deposit, is composed of the former Matthews and Chaffey mine sites. The Matthews mine site is located in North Crosby Township and the Chaffey mine site is located 750 m to the southeast on an island and beneath Newboro Lake in South Crosby Township. Exploration of the mineralized zones by New Mylamaque Mining and Smelting Limited from 1957–60 indicated the presence of approximately 45 million tons of ore, recoverable by open-pit extraction, and averaging 26.24% Fe and 6.60% TiO_2 (OFR5515, p91, MDI31C09NW00009, MDI31C09NW00011).

Current global market demands for iron ore has been steadily increasing as a result of China's continued strong growth in steel consumption. India is also expected to show an upward trend in iron ore consumption. A 200% price increase for scrap iron in 2004 has also contributed to the high demand for primary iron ore. The use of primary ore in steel production has become more profitable than using scrap iron.

Increased global demand and price for iron, high iron content of local deposits, new specialty applications for high-grade magnetite and closeness to markets may warrant further examination of the many magnetite occurrences and past-producing iron ore mines located in southeastern Ontario. Table 14 is a compilation of past iron producers in southeastern Ontario.

Table 7. Mineral deposits not currently being mined 2004–Southern Regional Resident Geologist (Southeast). Table Legend: MDI = Mineral Deposit Inventory and Status: I = Inactive, A = Active, M = Mining, E = Exploration; (Note: table does not include nepheline syenite, trap rock, REE and dimension stone deposits.)

Deposit/Township	MDI File Number	Status	Commodity	Reserves	Reserve Reference
Ore Chimney Prospect Barrie Township	MDI31C14SE-00142 (SO 1130)	I	Ag, Au ,Zn, Pb	11 000 tons above the 500-foot level Averages 0.2 ounces per ton Au, 5.64 ounces per ton Ag, 2.0% Zn & 1.0% Pb	MDC 12, p 132 MDC 18, p 33
Macassa Nickel Limerick Township	MDI31C13SE-00099 (SO 0595)	I	Ni ,Cu	2 000 000 tons @ 1.0% Ni, 0.25% Cu	MDC 12, p1 38
Renfrew Zinc (Renprior) Admaston Township	MDI31F07NE-00063 (SO 0286)	AE	Zn	16 000 tons @ 10.5% Zn to a depth of 30 m. Breakwater Resources optioned the property to Noranda Mining and Exploration in 1996	MDC 12, p 226 MDC 20, p 17
Harvey Simon Prospect Lyndoch Township	MDI31F03NW-00044 (SO 0259)	AE	Cu, Fe, Zn	250 000 tons @ 1.1% Cu to 350 feet	MDC 12, p 226 MDC 20, p 45
Clyde Forks Deposit Lavant Township	MDI31F02SE-00064 (SO 0351)	I	Cu, Sb, Ag, Hg	60 000 tons @ 0.67% Cu, 0.37 0% Sb, 0.03% Hg & 1.32 ounces per ton Ag	MDC 20, p 36
Twin Lakes Diorite Methuen Township	MDI31C12NW-00114 (SO 3840)	I	Ti	13.2 Mt of 21.7% TiO_2, recoverable from open pit to a depth of 165 m, with rock ore ratio = 0 : 54	CIM Bulletin, v 83, no 934, p 99

Deposit/Township	MDI File Number	Status	Commodity	Reserves	Reserve Reference
Grattan Deposit Grattan Township	MDI31F06NE-00017 (SO 0270)	I	Fe	Proven: 3 639 600 tons to a vein depth of 363 feet Indicated: 9 099 000 tons to a vertical depth of 600 feet @ average grade of 27.74% Fe	MDC 20, p.98
Radenhurst-Caldwell Deposit Lavant Township	MDI31F02NE-00012 (SO 0349)	I	Fe	Main lens 2000 feet long by 31.3 feet wide; contains 6 500 tons per slope foot at a grade of 32.77% Fe; 3 additional zones totaling 1 600 feet in length average 17%, 16.7% and 25.5% Fe respectively	MDC 20, p104
Bessemer Deposit Mayo Township	MDI31F04SE-00012 (SO 0235)	I	Fe	No 4 deposit 2 480 819 tons @ 28.62% recoverable Fe	MDC 20, p.110
Childs Deposit Mayo Township	MDI31F04SE-00013 (SO 0236)	I	Fe	6 193 330 tons @ 19.25% recoverable Fe	MDC 20, p.114
Tomclid Magnetite South Canonto Township	MDI31F02SW-00032 (SO0282)	AM	Fe	1993 published reserves estimated at 3 Mt averaging 40% Fe; reserve estimate has not been adjusted to reflect production from the deposit in late-1990's	MP 161, p.377
Calabogie Magnetite Property / Algoma Ore Prop. Ltd Bagot Township	MDI31F07SE-00009 (SO 0353)	I	Fe	Reserves of 45 million tons @ 25% Fe to 500 feet and 28% Fe to 1000 feet	MDC 11, p.314
Buckhorn Deposit Bagot Township	MDI31F07NE-00069 (SO0362)	I	Mo	Largest of numerous small lenses contains 1500 tons @ 1% MoS_2	MDC 20, p.132
Bannockburn (Madoc Mining Company Ltd.) Madoc Township	MDI31C12NE-00195(SO 7274)	I	Au	225 000 tons grading 0.267 ounces per ton Au	MP 161, p.377
Cooper Spruce Ridge Resources Ltd. Elzevir Township	MDI31C11SW-00044 (SO 2679)	I	Au, Talc	3 Mt @ 30-33% recoverable talc and 40 000 t @ 8.0 gpt Au	OFR 5945, p.92 OFR 5808, p.79
Dingman Deposit Marmora Township	MDI31C12SE-00040 (SO 3590)	AE	Au	7 Mt @ 1.8 gpt Au	OFR 5958, p.11-13
Hawley Ram Petroleum Limited Olden Township	MDI31C10NW-00117 (SO 4057)	AE	Wollastonite	2.5 Mt @ 32% wollastonite to a vertical depth of 75 m	OFR 5943, p.337
Marmora Gitennes Exploration Inc. Marmora Township	MDI31C12SE-00096 (SO 3729)	I	Wollastonite	450 000 t (open pit) @ 47% wollastonite, plus 680 000 t @ 39% wollastonite in a separate zone	OFR 5715, p.50
Trudeau C. Roger Young Hungerford Township	MDI31C11SW-00049 (SO 1192)	A	Calcite, Dolomite	4 Mt high-purity dolomite; no reserve estimate available for the calcite zone	OFR 5958, p.11-11
Verona-Kirkham Stewart Lake Resources Inc. Bedford Township	MDI31C10SE-00023 (SO 1244)	I	Graphite	1.6 Mt grading 9.5% graphite in 2 separate zones	MDC 33, p.16
Cal Graphite Corp. Butt Township	MDI31E11NE-00004 (N0129)	I	Graphite	Reserves of 60 Mt grading 3% graphitic carbon	MDC 33, p.10
Globe Graphite Mine North Elmsley Township	MDI31C16SE-00016 (SO 1604)	I	Graphite	500 000 t of approximately 7% graphite below mined out portion to the 300-foot level	MDC 33, p.25
Cordova Mine Belmont Township	MDI31C12SW-00005 (SO 1670)	I	Gold	115 982 tons grading 0.21 ounces per ton Au	OFR 5808, p.43
Newboro Prospect, North and South Crosby Townships	MDI31C09NW00009 (SO1466) MDI31C09NW-00011 (SO1469)	I	Iron, Titanium	45 Mt proven and probable averaging 26.24% Fe, 6.60% TiO_2	OFR 5515, p.316

Deposit/Township	MDI File Number	Status	Commodity	Reserves	Reserve Reference
Madawaska Mine Faraday Township	MDI31F04SW-00037 (SO0223)	I	Uranium	Measured reserve of 385,193 short tons grading 0.143% U_3O_8, 1,098,283 pounds U_3O_8, indicated reserve of 450,988 short tons grading 0.158% U_3O_8, 1,427,195 pounds U_3O_8, total reserves of 836,181 short tons grading 0.151% U_3O_8, 2,525,478 pounds U_3O_8	OFR 5515, p.393
Addington Mine Kaladar Township	MDI31C11NE-00010 (SO0882)	I	Gold	Total measured, indicated and inferred resource in four mineralized zones is estimated at 712,449 tonnes grading 4.5g/t Au	Imperial Metals Corporation, 1999

Table 8. Titanium, Tantalum, REE Occurrences compiled from MDI-2 database – Southern Regional Resident Geologist (Southeast).

Name	Township	MDI File #	Commodity	Deposit Status
Harrington, Marsh Ore Bed	Marmora	MDI31C05NE00135	Au, Fe, Ti	Occurrence
Green Island Rutile	Huntingdon	MDI31C06NW00088	Ti	Occurrence
Matthews, Newboro Lake	North Crosby	MDI31C09NW00009	Fe, Ti	Past Producer with Reserves
Chaffey	South Crosby	MDI31C09NW00011	Fe, Ti	Past Producer with Reserves
Tommy Lake	North Crosby	MDI31C09NW00131	Ti	Occurrence
Ricketts	Lake	MDI31C12NE00109	Fe, Ti	Occurrence
Orton	Tudor	MDI31C12NE00122	Fe, Ti	Past Producer w/o Reserves
Hastings Road Magnetite	Tudor	MDI31C12NE00185	Fe, Ti	Occurrence
Harold White, Twin Lake	Methuen	MDI31C12NW00114	Fe, Ti	Occurrence
Horse Lake, Tripp	Methuen	MDI31C12NW00127	Fe, Ti	Occurrence
Maloney	Marmora	MDI31C12SW00002	Cr, Cu, Fe, Ni, Ti	Past Producer w/o Reserves
Canadian Nickel	Methuen	MDI31C12SW00121	Ti	Occurrence
Ridgway	Marmora	MDI31C12SW00122	Cu, Fe, Ti	Occurrence
Jocko Lake	Limerick	MDI31C13NE00107	Fe, Ti	Occurrence
Umfraville	Wollaston	MDI31C13NW00057	Co, Fe, Phosphate, Ti	Occurrence
Canning Lake	Minden	MDI31D15NE00052	Fe, Ti	Occurrence
Pine Lake	Glamorgan	MDI31D16NW00215	Fe, Ni, Ti, V	Occurrence
Basin, Silver Crater (Basin)	Faraday	MDI31E01SE00054	Mica, Mo, Nb, Th, U, Ti	Past Producer w/o Reserves
Allen Lake	Harcourt	MDI31E01SE00306	Fe, Ti	Occurrence
Gal-Wood	Sabine	MDI31E08NE00010	Gd, Nb, Ta, Ti, U	Occurrence
Woodcox	Monteagle	MDI31F04NW00020	Ce, Feldspar, Nb, U, Ta, Th, Ti, Zircon	Past Producer w/o Reserves
Macdonald Mine	Monteagle	MDI31F04NW00023	Cu, Feldspar, Mo, Nb, REE, Th, Ti, U, Zircon	Past Producer w/o Reserves
Opeongo	Sebastopol	MDI31F06NE00093	Ag, Ce, Nb, Ta, Th, Ti, U, Y, Zircon	Occurrence
East Rockingham	Brudenell	MDI31F06NW00085	Au, Ti	Occurrence
South Lamberts	Griffith	MDI31F06SE00161	Ti	Occurrence
Horton Twp. Ottawa River	Horton	MDI31F10SE00019	Fe, Ti	Occurrence
Mahoney and Morin	Sabine	MDI31E08SE00002	Feldspar, Nb, REE, Ta, U	Past Producer w/o Reserves
Genesee No. 2 South	Monteagle	MDI31F04NW00018	Feldspar, Nb, Si, Ta, Th, U	Past Producer with Reserves
Plunkett, Plunkett South	Monteagle	MDI31F04NW00019	Ce, Feldspar, Amethyst, Mo, Nb, Th, Ta, U	Past Producer w/o Reserves

Name	Township	MDI File #	Commodity	Deposit Status
Dubblestein	Bangor	MDI31F05SW00010	Nb, Ta, Th, U	Occurrence
Toneys Lake, Tooley Lake	Brougham	MDI31F06SE00090	Nb, Ta, Th, U	Occurrence
Renfrew Minerals, Wal-Gem West Quarry	Lyndoch	MDI31F06SW00013	Be, Feldspar, Fluorite, Mo, Nb, REE, Sr, Ta, Th, U, Zircon	Producing Mine
Barr Feldspar Quarry, Woermke	Fraser	MDI31F14SW00003	Ce, Feldspar, Nb, Ta, Th, U	Past Producer w/o Reserves
Quinn	Olden	MDI31C10NW00366	Cu, Ni, REE	Occurrence
Orser-Kraft	South Sherbrooke	MDI31C15SE00027	Feldspar, Nb, REE, Th, U	Past Producer w/o Reserves
Nobles Bay, Rogers, J	North Burgess	MDI31C16SE00004	Mica, REE	Past Producer w/o Reserves
Maclaren, Willaim L	North Burgess	MDI31C16SW00017	Mica, Phosphate, REE	Past Producer w/o Reserves
Christie Lake	South Sherbrooke	MDI31C16SW00142	Magnetite, Nb, REE	Occurrence
Drude South	Cavendish	MDI31D09NW00079	REE, Th, U	Occurrence
Copper Anomaly	Lutterworth	MDI31D15SE00151	Cu, REE, Sr, Zircon	Occurrence
Rare Earth Anomaly	Lutterworth	MDI31D15SE00152	Cu, REE, Sr, Zircon	Occurrence
North Rare Earth Anomaly	Lutterworth	MDI31D15SE00153	Cu, REE, Sr, Zircon	Occurrence
Laurencin, Milhol	Cardiff	MDI31D16NE00160	Mo, REE, Th, U	Occurrence
Mclennan, J G	Peck	MDI31E07NE00006	Nb, REE	Occurrence
Malcovitch, P	Clyde	MDI31E08NW00003	Ce, REE, U	Occurrence
Gole, J G	Murchison	MDI31E09SE00004	Feldspar, Nb, REE, Sr, U, Zircon	Past Producer w/o Reserves
Cameron and Aleck	Murchison	MDI31E09SE00005	Feldspar, Nb, REE	Past Producer w/o Reserves
D'Eldona, Yankee Dam	Butt	MDI31E11NE00070	Nb, REE, U	Occurrence
Plunkett North	Monteagle	MDI31F04NW00185	Feldspar, REE, U	Occurrence
Lake Clear	Sebastopol	MDI31F06NE00092	REE, Th, U	Occurrence
Price, E C, Quadeville	Lyndoch	MDI31F06SW00014	Be, Feldspar, Fluorite, Nb, Phosphate, REE, Sr, Th, U, Zircon	Producing Mine
Universal Light Metals	Lyndoch	MDI31F06SW00065	Be, Ce, Nb, REE, Th, U	Occurrence
Lake Property, Lake Mine	Dickens	MDI31F12SW00006	Feldspar, REE	Past Producer w/o Reserves

***Note**: MDI-2 database was queried for Ti, Ta and REE occurrences. This listing indicates the presence of the commodities, not necessarily their order of abundance. This list should be used as a preliminary guide. Hard copies of these complete MDI files are located at RGP office in Tweed.*

Table 9. Historic Production of Gold – Southern Regional Resident Geologist (Southeast).

Mine	Township	Operating Years	Tons Milled	Ounces Produced	Grade (oz/ton)
Big Dipper	Barrie	1907-1909	52	17	0.33
Cook	Marmora	1901-1904	1 483	289	0.26
Cordova	Belmont	1892	120 670	22 774	0.19
Craig	Tudor	1905-1906	1 850	248	0.13
Deloro	Marmora	1897-1902	39 143	10 360	0.26
Gatling 5 Acre	Marmora	1900-1903	6 114	2 353	0.38
Gilmour	Grimsthorpe	1909-1910	550	172	0.31
Golden Fleece	Kaladar	1919-1922	Unknown	480	Unknown
Ledyard	Belmont	1893-1994	55	13	0.24
Pearce	Marmora	1893-1908	239	302	1.26
Richardson	Madoc	1866-1868	Unknown	75 – 100	0.408
Sophia	Madoc	1900-1941	1 800	110	0.06
Sovereign	Marmora	1878 1892-1900	Unknown 1 962	970 370	Unknown 0.19
Star of the East	Barrie	1905-1907	976	134	0.14
		Total	**174 894**	**38 592**	

Table 10. Historic production of copper, lead, zinc – Southern Regional Resident Geologist (Southeast).

Mine	Twp.	Operating	Tons Milled	Production
Kingdon	Fitzroy	1884-1885, 1914-1931	905 000	76 821409 lbs Pb conc ; 857 312 lbs Zn conc ; 60 074 072 lbs Pb rec
Long Lake	Olden	1897-1925, 1973-1974	3 442 ; NA	$41 550 ore value, 9 467 tons Zn valued at $1 227 000
Eldorado Copper	Madoc	1906	NA	234 000 lbs Cu matte containing 230 ounces Au, 182 ounces Ag & 109 000 lbs Cu
Hollandia Lead	Madoc	1903-06	NA	2 653 365 lbs Pb

Table 11. Historic production of iron – Southern Regional Resident Geologist (Southeast)

Mine	Township	Operating Years	Tons Milled	Grade (% Fe)
Calabogie	Bagot	1883-1901	10 000	26
Martel	Bagot	Pre 1890	2 000	58.71
Williams (Black Bay)	Bagot	1880-1890	25 000	51.89
Black Lake	Bedford	1882-1884	4 000	40
Glendower	Bedford	1873-1895	50 000	50-60
Belmont (Ledyard)	Belmont	1899-1900, 1911-1913	8 433	51.2
Blairton	Belmont	1820-1875	300 000	51.8
Playfair (Dalhousie)	Dalhousie	1866-1871	11 100	57.6
Radnor	Grattan	1901-1907	18 824	47.5
Eagle Lake (Blessington)	Hinchinbrooke	1887-1891	700	65.55
Tomahawk (Mag-Iron)	Lake	1947, 1950-1957	2 096	50.9
Wilbur	Lavant	Pre 1900, 1907-1908	146 892	56.69
Magnetawan	Lount	1910-1912	6 000	59.55
Paxton	Lutterworth	Before 1910	1 000	NA
Miller	Madoc	1899	6 823	NA
Wallbridge	Madoc	1900-1901, 1919, 1921	3 421	NA
Marmoraton	Marmora	1952-1978	28 000 000	40
Bessemer	Mayo	1902-1913	99 613	42.18
Childs	Mayo	1913	9 649	38.7
McNab	McNab	1873-1874	15 000	68
Robertsville & Mary	Palmerston	1895, 1900-1901, 1918-1909	13 477	70.5
Fournier	S. Sherbrooke	1873	600	60
Howland	Snowdon	1880-1882	1 500	58
Victoria	Snowdon	1882		58.35
Dog Lake	Storrington	1899	600	51.12
St. Charles	Tudor	1900-1902	5 186	57-60
Coe Hill	Wollaston	1884-1914	100 000	51.4
		Total	**28 841 914**	

Table 12. Historic production of fluorite – Southern Regional Resident Geologist (Southeast).

Mine	MDI Number	Township	Operating Years	Total Production (Tons)
Bailey	31C06NW00003	Madoc	1907, 1916, 1917, 1944-1950	25 000
Blakely	31C06NW00019	Huntingdon	1918-1920, 1928, 1941-1947	5 026
Coe	31C06NW00008	Huntingdon	1941-1942	114
Dwyer	31E01SE00091	Cardiff	1918-1920, 1943, 1944	97
Herrington South	31C05NE00009	Huntingdon	1917	13
Howard, Fred Hill	31C06NW00014	Huntingdon	1918, 1920, 1929, 1940-1942, 1944	2 500
Johnston	31C06NW00013	Huntingdon	1943, 1944-1947, 1949	187
Keene	31C06NW00004	Huntingdon	1918-19, 1943, 1944, 1950	5 000
Kilpatrick	31C06NW00005	Huntingdon	1944, 1953-1959	11 566
Lee Junior	31C05NE00008	Madoc	1917, 1940, 1943-1945	2 000
Lee Senior	31C05NE00006	Madoc	1916-1918, 1942, 1943	1 600
McIlroy	31C05NE00003	Madoc	1917-18, 1923, 1944	540
Miller	31C05NE00005	Madoc	1917-1919	460
Noyes	31C06NW00011	Huntingdon	1917-20, 1941-1943	25 000
Palmateer	31C06NW00016	Huntingdon	1942	44
Perry	31C06NW00009	Huntingdon	1915-20, 1941-1943	8 000
Perry Lake	31C06NW00007	Huntingdon	1910, 1913, 1915, 1917, 1952, 1960	4 000
Ponton	31C05NE00004	Madoc	1929-1942	1 500
Rogers	31C06NW00018	Huntingdon	1909-1914, 1943-51	45 000
Rooks	31C12SE00003	Madoc	1916-18	100
South Reynolds	31C06NW00010	Huntingdon	1917-18, 1943	100
Wallbridge & Herrington	31C05NE00007	Madoc	1920-1922, 1941-1943	6 600
William Reynolds	31C12SE00002	Madoc	1941-42	88

Fluorspar, a commercial fluorite product, is used as a flux in the making of steel and ceramics, as a constituent in the electrolytic process of making aluminum and in the production of hydrofluoric acid (HF). During World War II, a Canadian Government assistance program in the form of loans and drill hole explorations stimulated development of the Madoc deposits (G. Guillet, IMR 12, p 1).

Table 13. Magnetite past producing mines–Southern Regional Resident Geologist (Southeast). Legend: MDI = Mineral Deposit Inventory and Status.

Deposit/Township	MDI File Number	Description	Reference
Marmoraton Marmora Tp	MDI31C05NE-00014 (Past Prod. W. Reserves)	27,966,762 tons of ore averaging 42.8% Fe produced.	OFR 5515, p.322
Glendower Bedford Tp	MDI31C10SE00022 (Past Prod. W/O Reserves)	Early drilling indicated massive and disseminated ore at a depth of 500 feet.	MRC 11, p.135
Tomahawk Lake Tp.	MDI31C12NW00002 (Past Prod. W. Reserves)	Lenses and patches of magnetite occur over a strike length of approximately 1,000 feet.	MRC 11, p.155
Coe Hill Wollaston Tp.	MDI31C13SW00010 (Past Prod. W. Reserves)	Reserves estimated in 1914 at 600,000 tons averaging 51.4% Fe.	MRC 11, p.177-178
Radenhurst and Caldwell Lavant Tp.	MDI31F02NE00012 (Past Prod. W. Reserves)	Main zone with indicated tonnage of 6,500 tons of ore per slope foot averaging 32.77% Fe. Three additional zones totalling 1,600 feet in length, averaging 17.08%, 16.71% and 25.50% Fe.	MRC 11, p.251
Wilbur Lavant Tp.	MDI31F02SE00009 (Past Prod. W/O Reserves)	Nine workings reported.	MRC 11, p.252
Bessemer Mayo Tp.	MDI31F04SE00012 (Past Prod. W. Reserves)	Reserves estimated at 2,480,819 tons averaging 28.62% recoverable Fe from 4 deposits.	MRC 11, p.167
Childs Mayo Tp.	MDI31F04SE00013 (Past Prod. W. Reserves)	Reserves estimated at 6,193,330 tons averaging 19.25% recoverable Fe.	MRC 11, p.169
Rankin Mayo Tp.	MDI31F04SE00016 (Past Prod. W. Reserves)	Reserves estimated at 15,691,599 tons containing 15.3% recoverable Fe.	MRC 11, p.170
Calabogie Bagot Tp.	MDI31F07SE00009 (Past Prod. W. Reserves)	The deposit contains 27.2 million tons of ore grading 22.28% Fe proven by diamond drilling, recoverable by open pit.	MDC 20, p.67
Bluff Point Bagot Tp.	MDI31F07SE00011 (Past Prod. W/O Reserves)	Two main magnetite-bearing zones, each about 500 feet long and 40 feet wide.	MRC 11, p.313
Martel Bagot Tp.	MDI31F07SE00013 (Past Prod. W/O Reserves)	Magnetite body 20 feet thick, dipping 60 SE.	MRC 11, p.317
Williams Bagot Tp.	MDI31F07SW00027 (Past Prod. W/O Reserves)	Two zones of magnetite, approximately 800 and 240 feet long, 20 feet wide.	MRC 11, p.318
Blairton Belmont Tp.	MDI31C05NW00026 (Past Prod. W. Reserves)	1914 reserves calculated at 1.8 million tons of 51.8% Fe and 0.5 million tons of 54.9% Fe.	MRC 11, p.288
Matthews North Crosby Tp.	MDI31C09NW00009 (Past Prod. W. Reserves)	Estimated reserves to depth of 400 to 500 feet are 33,727,000 gross tons averaging 25.08% Fe, which includes 11,861,000 gross tons averaging 31.36% Fe.	MRC 11, p.257
Chaffey South Crosby Tp.	MDI31C09NW00011 (Past Prod. W. Reserves)	Reserves estimated to a depth of 500 feet are 11,110,000 gross tons averaging 29.76% Fe.	MRC 11, p.258
Belmont (Ledyard) Belmont Tp.	MDI31C12SW00004 (Past Prod. W. Reserves)	Drilling from 1906 indicated 200,000 tons of concentrating ore.	MRC 11, p.287
Summit Lake (Tomclad) South Canonto Tp.	MDI31F02SW00032 (Past Prod. W. Reserves)	Published reserves in 1993 estimated at 3 Mt averaging 40% Fe; reserve estimate has not been adjusted to reflect production from the deposit in late-1990's.	MP 161, p.377
Grattan (Radnor) Grattan Tp.	MDI31F06NE00017 (Past Prod. W. Reserves)	Proven reserves of 3,639,600 tons to a vein depth of 363 feet and indicated reserves of 9,099,000 tons to a vertical depth of 600 feet, averaging 27.74% Fe.	MDC 20, p.98
Black Lake Bedford Tp.	MDI31C10SE00026 (Past Prod. W/O Reserves)	Disseminations and massive magnetite in exposed widths from 10 to 50 feet.	MRC 11, p.134
St. Charles Tudor Tp.	MDI31C13SE00014 (Past Prod. W/O Reserves)	Three main deposits within an area of approximately 13 500 square feet.	MRC 11, p.176
Robertsville Palmerston Tp.	MDI31C15NE00005 (Past Prod. W/O Reserves)	Two zones, Robertsville Mine is 700 feet long and 50 feet wide and the Mary Mine 900 feet to NW.	MRC 11, p.141
Howland Snowdon Tp.	MDI31D15SE00096 (Past Prod. W/O Reserves)	Magnetite in a zone 25 feet in diameter at surface and larger with depth.	MRC 11, p.149
Victoria Snowdon Tp.	MDI31D15SE00098 (Past Prod. W/O Reserves)	Deposit was worked from a trench 240 feet long and 16 feet wide.	MRC 11, p.150
Yuill Darling Tp.	MDI31F02NE00009 Past Prod. W/O Reserves)	Lens of high-grade magnetite, 30 m long and 9 m wide, mined to a depth of 21 m.	MDC 20, p.92

Note: The resource estimates listed in this table are historic figures generated by past workers and do not follow the required disclosure for reserves and resources as outlined in National Instrument 43-101.

OGS ACTIVITIES

There were no Precambrian Geoscience Section field projects conducted in southeastern Ontario in 2005.

R. M. Easton, Precambrian Geoscience Section, Ontario Geological Survey, spent approximately 6 weeks of the 2004 field season in the geological mapping and sampling of a portion of western Tudor and eastern Grimsthorpe townships. Although the area has been actively explored since 1989, the geological base and knowledge on the controls on gold mineralization in the area are limited. As part of that study, 3 samples were collected for U/Pb geochronology. From analyses completed in 2005, Easton reports,

> *"the 3 samples yielded the same age, within error and indicated that the gold mineralization and shear zone development occurred within a short interval at 1282Ma".*

For a detailed description of the project please refer to Project Unit 04-013. Timing of Gold Mineralization in the Western Grimsthorpe Domain Central Metasedimentary Belt, Grenville Province *in* Summary of Field Work and Other Activities 2005, Ontario Geological Survey, Open File Report 6172, p. 15-1 to 15-10 (2005).

F. R. Brunton, J.E.P Dodge and J. Shirota, Sedimentary Geoscience Section, Ontario Geological Survey began a comprehensive study of karst features in southern Ontario. For a detailed description of the project please refer to Project Unit 05-012. Karst in Southern Ontario *in* Summary of Field Work and Other Activities 2005, Ontario Geological Survey, Open File Report 6172, p. 27-1 to 27-7 (2005).

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Ontario

Ontario Geological Survey
Regional Resident Geologist Program

Southern Ontario Regional Resident Geologist (Southwest Ontario District and Mines and Minerals Information Centre)—2005

by

K. Steele, C. Lee and M. Barua

2006

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Southern Ontario Regional Resident Geologist (Southwest Ontario District) and Mines and Minerals Information Centre–2005

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INTRODUCTION

The Mines and Minerals Information Centre (MMIC) and the Southwest Ontario District Geologist's Office are located at 900 Bay Street in room M2-17, Macdonald Block, Queen's Park, Toronto. The MMIC is an information, research and sales office for the Mines and Minerals Division (MMD) of the Ministry of Northern Development and Mines (MNDM).

The Southwest Ontario District Geologist's Office, a unit of the Ontario Geological Survey's Resident Geologist Program (RGP), provides geological expertise and assistance to the mining, consulting, academic, land use planning and exploration communities, and various earth science-related services to the general public.

The Centre offers geological information and research materials, advisory services and expertise on Ontario's geology, mineral resources and mining industries. MMIC staff also provides assistance and referral for clients who seek information concerning Ontario's Mining Act.

Three mines, 42 quarries and 2 brine fields extracted industrial minerals, non-aggregate stone and dimension stone within the Southwest Ontario District in 2005 (Figure 1). These operations, including on-site processing facilities, employed approximately 3000 people in southwestern Ontario. All Ontario production of salt, gypsum/wallboard, natural gas and petroleum, and most of the province's production of shale/brick, lime/dolime, sand and gravel, cement and stone comes from the Southwest Ontario District.

Market demand for all mineral commodities produced within the District was strong during 2005. The markets for salt and dimension/landscape stone where particularly strong during the year. Table 1 lists selected industrial mineral and fuel production in Ontario for 2002 to 2004, the most recent years for which production information is available.

Exploration, advanced exploration and development in the Southwest Ontario District maintained a healthy level of activity in 2005. The search for undiscovered deposits of dimension/landscape stone, high-purity limestone and dolostone, aggregate, shale/brick and other commodities should result in new quarries and/or mines coming into production in the future.

MINING ACTIVITY

In 2004 (the last year for which statistics are available, Table 1), the mining and quarrying of industrial minerals in the Southwest Ontario District generated approximately $1.95 billion of production value or over one quarter of Ontario's overall revenues from mineral production. This makes southwest Ontario one of the leading mineral extraction areas of the province.

All of the province's salt, gypsum, natural gas and petroleum production, almost all of the clay/shale products and lime production, as well as a large percentage of the cement, sand and gravel, and stone production come from the

Southwest Ontario District. The locations of all active mineral extraction operations in southwest Ontario are shown on Figure 1 (operations that extract construction aggregate, natural gas or petroleum are not included). The mines, quarries and brine well fields listed extract a variety of commodities for numerous end products, including salt (road salt, chemicals, food), gypsum (wallboard), limestone (lime, cement, glass, steel, building stone), shale (cement, bricks), dolostone (chemicals, glass, steel, building stone), sandstone (building stone) and gneiss (building stone, specialty aggregate).

Reported production figures for the 2 underground salt mines and the underground gypsum mine operating in the Southwest Ontario District in 2005 are presented in Table 2.

All of the province's oil and gas production occurs in the Southwest Ontario District. For information on oil and gas exploration and development activity in Ontario in 2005, please refer to the report of the Petroleum Resources Centre, in this volume.

PRODUCERS AND RECENT DEVELOPMENTS

Salt

In 2005, two companies extracted salt in Ontario. Sifto Canada Inc., in Goderich and The Canadian Salt Company Limited, in Windsor, continued to operate both rock salt mines and brine well fields.

Compass Minerals Group Inc., the parent company of Sifto Canada Inc., is one of the largest producers of rock, or highway de-icing, salt in North America and the United Kingdom, and operates the largest highway de-icing salt mines in these regions. The Goderich Mine is the largest rock salt mine in the world. The company sells highway salt primarily to state, provincial, county and municipal highway departments for de-icing applications.

Rohm and Haas Co., the parent company of The Canadian Salt Company Limited, is the largest producer of salt in North America.

Ontario rock salt production in 2005 achieved 8.99 Mt; this was just above 2004 production totals (see Table 2). In 2005, the Goderich Mine again achieved a record production level. The Ojibway Mine had slightly reduced production in 2005 due to a maintenance project on its main haulage shaft (J. Vincent, The Canadian Salt Company Ltd. and K. Cassidy, Sifto Canada Inc., personal communication, January and February 2006).

In the past year, demand for general trade salt remained robust and production from The Canadian Salt Co.–Windsor fine salt facility (brine field and evaporation plant) and the Sifto Canada–Goderich evaporator plant continued at strong levels.

The salt extraction and processing industry employed approximately 805 workers in southwestern Ontario in 2005.

During the 2005-06, it is estimated that the industry will invest approximately $13 million in upgraded haulage and scaling equipment and mill and shaft facilities, in addition to regular production and maintenance capital costs (J. Vincent, The Canadian Salt Company Ltd. and K. Cassidy, Sifto Canada Inc., personal communication, January and February 2006; Business Wire, August 2005).

COMPANY AND INDUSTRY NEWS

Rohm and Haas Co of Philadelphia, PA, parent company of the Canadian Salt Company, in early 2005 reported that the salt business in 2004 made an operating profit of US$50 million on sales of US$829 million compared with US$54 million on sales of US$801 million in 2003 (Blendon Information Services, February 2005).

For 2005, Rohm and Haas Co. reported increased salt sales of 12%, 9% and 7% in the first three financial quarters, respectively. The improvement reflects higher demand and sales volumes for ice control products because of severe winter weather, as well as increased selling prices, a more favourable product mix, and favourable currency exchange rates. The company's quarterly earnings for the salt business were up US$7 million, down US$2 million

and down US$1 million for the first three quarters of 2005. The losses were attributed to higher production, energy, and distribution costs (Blendon Information Services, May 2005, September 2005, November 2005).

Compass Minerals International Inc. of Overland Park, KS, parent company of Sifto Salt, reported for 2004 a net income of US$49.8 million compared with US$39.3 million in 2003. For 2004, Compass' salt sales were a record US$607.5 million, an 11% increase over 2003. The growth was attributed to an increase in highway deicing commitments, strong consumer deicing sales, price improvements, and moderate base-business volume gains in both product lines (Blendon Information Services, February 2005).

In August 2005, Compass Minerals announced plans to install a new mill at the company's Goderich rock salt mine. Compass will invest $7 million over the next two years in a high-capacity mill. The new, state-of-the-art equipment is expected to reduce the cost of production, maintenance and energy at the mine and will allow the facility greater flexibility to manage production processes. It is expected to be operational by mid-year 2006 (Business Wire, August 2005).

Compass Minerals reported 2005 first quarter salt sales of US$242.6 million, up from US$228.7 million in the prior year period. Second quarter salt sales increased 14% over the prior year. Compass Minerals reported third quarter salt sales which increased 4% year-over-year, reflecting a 5% improvement in the average price of highway deicing salt, to US$27.76/ton, and a 6% improvement in the average price of general trade products to US$95.21/ton. In addition to pricing improvements, the company benefited from favourable weather, earlier ordering for the upcoming winter season, modest gains in the company's highway deicing customer base, and favourable exchange rates. The second quarter had strong industrial and water conditioning sales which helped boost revenues for Compass's general trade products (Blendon Information Services, June and November 2005; Business Wire, August 2005).

General Chemical Canada Ltd. announced on January 19, 2005 the closure of its 86 year-old Amherstburg calcium chloride plant effective on January 23, 2005, putting about 100 employees out of work. The operator of the 450 000 tons/year liquid and flake calcium chloride and magnesium hydroxide facility filed for bankruptcy protection. The company cited accelerated pension funding requirements, higher energy costs and a strong Canadian dollar as reasons for the closure. General Chemical's operation had struggled since 2001 when the company mothballed the 500 000 tons/year soda ash facility and laid off 245 employees. The Brunner Mond Company built the plant in 1918. By 1948 the plant employed more than 1000 people. Over the years, the company had operated high-purity limestone quarries and salt brine fields in the Amherstburg area to feed the plants (*Windsor Star*, January 19, 2005; Blendon Information Services, February 2005). As of mid November, the court appointed receiver of General Chemical's assets had failed to find a buyer for the idle calcium chloride plant as a going concern, and was expected to proceed with a liquidation of the assets (Blendon Information Services, December 2005).

Gypsum

In 2005, gypsum was mined at Hagersville by CGC Inc. where the company has extensive wallboard manufacturing facilities. The mine operated at capacity, with approximately 700 000 t of gypsum extracted in 2005. The mined natural gypsum is mixed with flue gas desulphurization (FGD) gypsum as inputs to the wallboard plant (B. Chisholm, CGC Inc., personal communication, February 2006).

Georgia-Pacific Canada Inc. operates a wallboard facility in Caledonia using gypsum imported from Nova Scotia. The company stopped mining at this location in 2004. BPB Canada Inc. operates a wallboard facility in Mississauga, using FGD gypsum supplied by Ontario Power Generation. All gypsum mining and wallboard manufacturing operations in Ontario are located within the Southwest Ontario District.

In Canada, particularly in southern Ontario, the demand for wallboard remains strong in the residential and renovation sectors. All Ontario wallboard plants operated at or near capacity in 2005.

The Hagersville Mine and on-site wallboard manufacturing plant employed approximately 300 personnel in 2005.

COMPANY AND INDUSTRY NEWS

The research organization Freedonia Group forecasts that the North American market for gypsum products will advance 1.7% per year through 2009 to 50 Mt. Gains as measured in dollar value will rise 3.7% per year to US$4.9 billion. Wallboard is the dominant gypsum product sold in North America, accounting for nearly three-quarters of total tonnage in 2004. Demand for wallboard is expected to advance to 41 billion square feet by 2009 (Blendon Information Services, October 2005).

The global plaster wallboard market has grown by more than 60% since 1995, from 4.1 billion m^2 to approximately 6.7 billion m^2. It is expected that a combination of demographic trends, economic growth, increasing product penetration, and more stringent building regulations in developed economies will support a dramatic increase in market growth. It is expected that the global wallboard market will increase by around 33% by 2010, implying a 6% per annum growth. North America growth is forecast at 3–4% per annum (*Industrial Minerals*, editorial, October 2005).

CGC Inc of Mississauga, the Canadian wholly-owned subsidiary of USG Corp, reported for the first quarter of 2005 increased manufacturing costs which resulted in a slight decline in first quarter operating profit to US$12 million. Wallboard sales were 3% higher at US$75 million, reflecting the strength of the Canadian dollar (Blendon Information Services, May 2005). For the second quarter CGC generated a second quarter operating profit of US$14 million on net sales of US$82 million compared with US$9 million on sales of US$68 million in the second quarter of 2004. The company attributes the improvement to higher selling prices and record shipments of Sheetrock® Brand gypsum wallboard (Blendon Information Services, August 2005). For the third quarter, CGC reported net sales of $81 million, which was $8 million higher than last year's third quarter. Operating profit of $12 million was the same as in the third quarter of 2004. For the first 9 months of 2005, USG net sales for the first nine months of 2005 were $3.80 billion, a record for any nine-month period in the Corporation's history (www.usg.com, report dated December 2005).

BPB Canada Inc of Mississauga has begun construction of a new finishing products plant in Oakville, Ontario. The plant will manufacture a variety of products including joint compounds, textures, and coatings which are used in the process of installing and finishing gypsum wallboard. The new facility will replace an existing plant in the Toronto area when it is commissioned in late 2005 (Blendon Information Services, May 2005).

BPB plc of England had reported a 78% increase in North American operating profit to US$129.7 million for the year ended March 31, 2005. The improvement was attributed to strong residential building and renovation markets which sustained a significant increase in average gypsum wallboard prices. The company had 9% higher North American sales at US$966.7 million. BPB says that it operated its wallboard plants in Canada near capacity during the year as construction activity remained strong. The company also increased exports to the U.S. by 20% to supplement constrained manufacturing capacity in the northeast U.S. (Blendon Information Services, June, 2005).

For the six-month period ending September 30, 2005, BPB reported a North American operating profit up 44.1%, to US$93.3 million. The company benefited from significantly higher gypsum wallboard prices (Blendon Information Services, November 2005).

In mid-2005, Saint-Gobain SA of France launched an unsolicited cash offer for all of the outstanding shares of BPB plc of England. Late in the year, the board of BPB plc unanimously recommended that shareholders accept a sweetened takeover bid from Saint-Gobain SA. Saint-Gobain upped its offer and the transaction values BPB at approximately £3.9 billion (US$6.7 billion) (Blendon Information Services, November 2005).

Georgia–Pacific Corp of Atlanta reported that in the second quarter of 2005 its gypsum business achieved both price and volume increases driven by the strength of residential and commercial demand. During the quarter the company took a US$3 million charge for the closure of its gypsum mine in Caledonia, Ontario (Blendon Information Services, August 2005).

PPL Corp of Allentown, Pennsylvania will invest approximately US$1.5 billion between now and 2010 to add limestone scrubbers at some of its coal-fired generating stations. All of the byproduct (FGD) gypsum generated by PPL's scrubbers will be consumed by adjacent wallboard plants. This is the latest in a constant parade of announcements in new and updated scrubber technologies to be installed at coal-fired power plants across the eastern US and construction or upgrading of the adjacent wallboard plants. In Ontario, Ontario Power Generation

has announced plans to close all of the province's coal-fired generating stations by the end of the decade. The Lakeview station closed in April, 2005; the Lambton station is scheduled to close by the end of 2007; and all of the units at Nanticoke will be closed by early 2009. Only the Lambton station is equipped with a FGD system. The plant has been supplying synthetic gypsum to the Mississauga wallboard plant of BPB Canada since 1995 (Blendon Information Service, August 2005).

Lafarge North America Inc. approved a US$120 million expansion of its gypsum wallboard facility in Silver Grove, Kentucky. Lafarge says the expanded facility will help to meet the growing needs of the company's customers in the north central region of the U.S. and southern Ontario. Lafarge plans to continue to use 100% synthetic (FGD) gypsum at this facility (Blendon Information Services, November 2005).

Cement

Five cement plants, 3 limestone quarries and a shale quarry are located in southwestern Ontario. St. Marys Cement (Canada) Inc. operates limestone quarry and cement plant complexes at Bowmanville and St. Marys. Votorantim Cimentos of Brazil is the parent company of St. Marys Cement. Lafarge Canada Inc., a subsidiary of Lafarge North America, operates a limestone quarry and cement plant near Woodstock. St. Lawrence Cement Inc. operates a cement plant and adjacent shale quarry in Mississauga. Limestone is shipped to this cement plant from the company's Ogden Point quarry in southeastern Ontario. Swiss-based Holcim AG owns St. Lawrence Cement Inc. Federal White Cement Ltd. operates a specialized product cement plant near Woodstock using limestone purchased from local quarries.

The five cement plants have a total cement (clinker) production capacity of over 6 Mt, and an active capacity of over 5.5 Mt. Primary stage clinker production is more indicative of ultimate cement production capacity because this is the most capital and energy-intensive stage and clinker can be stockpiled for later use or sale (Natural Resources Canada, Canadian Minerals Yearbook, 2005).

Cement production levels remained high in 2005 in response to continuing strong demand in the southern Ontario and U.S. Great Lakes markets.

Total cement production from Southwest Ontario District plants is estimated at over $460 million for 2004. In the District, cement quarries and plants employed approximately 630 Ontario residents in 2004.

COMPANY AND INDUSTRY NEWS

Early in 2005, St. Lawrence Cement Group reported that for the full year 2004, sales were $1.28 billion, an increase of 11% compared to 2003. Operating profit in 2004 increased 10% to $131.4 million. The year-over-year improvement in results was driven by higher cement prices in all markets. The company incurred significant increases in energy costs, offset in part by efficiency improvements and increased use of alternative fuels, as well as the favourable impact of the conversion of U.S. costs into Canadian dollars (www.stlawrencecement.com, report dated February 2005).

In late September, St. Lawrence Cement Group reported results for the first nine months of 2005. Sales were $950 million, an increase of 5.9% compared to the same period a year earlier. The increase was mainly due to the strong activity in the construction services business, but included growth in cementitious products sales volumes and a price increase in the US market (www.stlawrencecement.com, report dated September 2005).

In April, Lafarge North America reported first quarter cement segment results. Total sales volumes were 2 Mt, up 7% compared with last year, but Canadian volumes declined slightly (Lafarge NA, press release April 2005). Second quarter results had cement operations income of $131.5 million, 17% higher compared with the second quarter of 2004. Canadian cement sale volumes increased 4% to 1.1 Mt versus a year earlier. Average cement prices were 10% higher versus a year earlier due to 2 price increases in 2004 and an additional increase in early 2005 (www.lafargenorthamerica.com, report dated July 2005). Finally, the third quarter results of Lafarge NA, the cement segment reported operating income of $145.8 million, a decline of 3% compared with the third quarter 2004. Cement sales volumes slowed to 4.7 Mt following strong growth during 2004 and the first half of 2005. U.S. volumes declined 4% compared with last year, while Canadian shipments increased 4%. Market demand in the Great Lakes region and eastern Canada was weaker during the quarter (www.lafargenorthamerica.com, report dated November 2005).

Clay/Shale Products

Southwest Ontario contributes 95% of Ontario's brick production, an amount estimated at $185 million for 2004.

In 2005, four companies extracted shale from 7 quarries in southwest Ontario for heavy clay products, supplying 6 brick and tile manufacturing operations within the District. Two large operators, Hanson Brick and Brampton Brick, have both quarrying and manufacturing facilities. One smaller operator, Century Brick, also has both quarrying and manufacturing facilities. These companies extract Queenston shale in the area between Brampton and Hamilton, plus in 2005 from a reactivated site at Niagara-on-the-Lake. Two small quarries owned by JADE Hardwoods Inc. at Thedford and Brampton Brick Ltd. at Arkona, supplied shale to Paisley Brick and Tile Co. Arkona Formation shale forms the resource rock at these quarries. Approximately 1.0 Mt of shale was extracted from the 7 quarries.

In 2005, these six brick making plants produced approximately 600 million modular brick equivalent units, the industry standard measure. More than 80% of these bricks were sold for residential construction, dominantly in southern Ontario. The remainder was used in architectural, industrial and institutional construction. All producers reported that demand for brick products continues to be good in the main Toronto–Golden Horseshoe market and across North America.

Shale quarries and brick making plants employed approximately 525 people in southwestern Ontario in 2005.

In 2005, Hanson Brick quarried Queenston shale at their Burlington and Aldershot quarries located between Toronto and Hamilton. Hanson Brick operated three large brick plants, a plant at Aldershot and two adjacent to their Burlington Quarry. Production capacity at the Hanson Brick plants is approximately 500 million modular brick equivalent units per year. In 2005, Hanson Brick reopened its Niagara-on-the-Lake Quarry for the extraction of Queenston shale (A. Norris, Hanson Brick Ltd., personal communication, February 2006).

Brampton Brick Ltd. trucked Queenston shale from their Cheltenham Quarry a distance of 10 km to their brick plant in northwest Brampton. The Brampton plant has a capacity of approximately 300 million modular brick equivalent units per year.

Century Brick operated a quarry near Georgetown that supplied a brick plant in downtown Hamilton.

The brick products industry in Ontario currently extracts almost all of its resource materials from the Queenston Formation shale. Queenston Formation occupies a narrow, wedge-shaped area located immediately east of the Niagara Escarpment and extends from Georgian Bay to the Toronto and Hamilton areas. In addition, Queenston Formation underlies most of the lands along the Niagara Peninsula, which are below the Niagara Escarpment. Much of the area underlain by the Queenston Formation is already highly urbanized and/or on the Niagara Peninsula developed into vineyards and wineries. Urban expansion of the Greater Toronto Area, land use planning initiatives to preserve green space, prime agricultural and natural heritage lands, and infrastructure corridors are increasing major threats to the long-term continuity and development of the brick industry in Ontario by occupying areas containing increasingly scarce, accessible Queenston shale resources.

COMPANY AND INDUSTRY NEWS

In April 2005, Brampton Brick Ltd. reported its year-end financials for 2004. It was another year of strong financial performance for the company, although not quite at the record levels reported in the past two years. Net income for the year amounted to $15.7 million on net sales of $105.9 million. This represents a 14% drop in net income and a 1% gain in sales compared to 2003. The continued strong demand for new houses fueled brick sales volumes. A six week road builder's strike, generally unfavourable weather conditions throughout most of the year and reduced construction activity resulted in a modest 6.1% decline in brick shipments. The negative effect of lower shipments in Ontario was partially offset by increased shipments into the U.S. and Quebec, as well as slightly higher average selling prices. In 2004, the Company's newest brick kiln, which had been operating at capacity since going into production in 2000, was shut down for maintenance and inspection in early December. This had a relatively minor negative impact on annual results in 2004 (www.bramptonbrick.com, report dated April 2005).

Brampton Brick's 2005 first quarter report indicated a small loss compared to a small profit for the same quarter in 2004. Residential construction activity was lower in the first quarter of this year due to poor weather conditions. As a

result brick shipments decreased by approximately 26%. Net income generated by the brick business segment decreased due to lower brick shipments and maintenance expenses of scheduled kiln shutdown of one kiln. The kiln shutdown, which lasted until mid-February, caused 30.3% reduction in brick production versus the first quarter of 2004 when all three kilns operated at capacity throughout the quarter (www.bramptonbrick.com, report dated May 2005).

In August, the 2005 second quarter report from Brampton Brick indicated higher volumes and higher average brick selling prices produced a 7.0% increase in consolidated net sales. In the second quarter the company commenced production of two new brick sizes – Premier Plus and Engineered. Prior to 2005, approximately 95% of the Company's brick sales volumes were accounted for by one brick size called the Premier. The Premier Plus is a larger brick size. Sales of the Premier Plus represented approximately 25% of brick shipments for the second quarter. The other new size, called Engineered-size was introduced primarily to service the U.S. market. Production of this size began late in the second quarter and accounted for only a very small percentage of shipments (www.bramptonbrick.com, report dated August 2005).

Brampton Brick third quarter results mirrored second quarter performance. Higher volumes and higher average brick selling prices resulted in 9.1% increase in net sales. The increase in the average brick selling price was due to a shift in product mix to a larger size brick (www.bramptonbrick.com, report dated November 2005)

The re-opening of the Niagara-on-the Lake Quarry by Hanson Brick after 40 years of inactivity has raised some local concerns. On August 12, the *St. Catharines Standard* highlighted the issue under the "Residents fear impact of quarry" banner.

> "Residents of a rural Niagara-on-the-Lake area have long known there was an inactive quarry nearby, but they didn't think it would be opening up again. Swans had taken up residence in the ponds that covered the old quarry lands and coyotes and deer regularly visited the property's forested areas since excavation stopped in the early 1980s. Now, residents fear the wildlife will flee their quiet neighbourhood when a Mississauga-based company reopens the 100-acre quarry. "They're taking down all the trees and they're making a truck road," said Janis Lenard, 53, who lives across from the quarry at Line 8 and Concession 5. Lenard worries the area will get noisier as 40 truckloads leave the quarry every day to take shale to a brick-making plant in Burlington.
>
> The quarry's owner, Hanson Brick Ltd., says the company needs the shale to replace depleted supplies from its quarry in Milton. In a brochure on the quarry reopening given to residents last November, the company said it plans to excavate 100,000 tonnes of shale a year.
>
> "Right now, the little kids can ride up and down the street on their bikes," said Lenard of her neighbourhood near Queenston Road, not far from the Glendale exit of the QEW. "They're taking a totally beautiful area and ruining it."
>
> Calls to Hanson Brick on Thursday were not returned. In its brochure, though, the company said the shale deposits are soft, allowing for excavation without loud drilling or blasting. The brochure also said the company planned to begin shipping the shale in May, but residents said that hasn't happened so far. Lenard said she's heard shipments will begin in September.
>
> Kim Craitor, Liberal MPP for Niagara Falls, is concerned about the quarry, but said the company does have a longstanding right to operate it through a licence from the Ontario Ministry of Natural Resources. "It's an existing quarry," he said. "It's an approved quarry. It's allowed to operate." Saying he was "shocked" when he recently learned of the quarry's existence, Craitor said residents' concerns "have to be addressed." "I'm very sympathetic to the residents who are going to be impacted in this area," he said."

Chemical, Metallurgical, Environmental, and Filler Limestone and Dolostone

Ontario's lime industry is primarily situated in the Southwest Ontario District. Within the District in 2005, 3 quarrying operations extracted limestone or dolostone for use in the lime, chemical, metallurgical, environmental and filler products industries. Southwestern Ontario limestone is also sold for aglime, aggregate, landscaping and engineering uses. Carmeuse Lime Canada Ltd -Beachville Operations, produces high-calcium lime from Lucas Formation limestone. Carmeuse Lime Canada Ltd. – Dundas Operations produces dolomitic lime or dolime from Guelph Formation rock purchased from the adjacent Dundas Quarry of Lafarge Canada Inc. E.C. King Contracting extracts glass-grade dolostone from the Amabel Formation at the Sydenham Quarry near Owen Sound.

Lime, dolime, and high-purity limestone and dolostone markets are dominated by the demand for product from the steel making industry. After a number of poor years in the steel industry, in 2004 and again in 2005 lime producers benefited from strong steel production and lime demand. Though the steel industry is the dominant market, sales into other markets are gaining ground, including float glass, filler and environmental uses.

Quarries extracting limestone or dolostone for use in the lime, chemical, metallurgical, environmental and filler products industries, and associated on-site processing plants, employed approximately 200 people in southwestern Ontario in 2005.

COMPANY AND INDUSTRY NEWS

World-wide, refractory dolomite production is strongly influenced by the fortunes of the steel industry, its major market. Logistics and the location of steel plants are major reasons for the geographic spread of producers. Another is the scarcity of the high-purity, homogeneous grain size dolostone needed to produce the minimum density after sintering. Low levels of impurities (<1.5%) are important as is an MgO content of more than 18% by volume. In addition to its use in the production of refractory brick, refractory dolostone and dolime are used as a steel flux and to repair and maintain the linings of electric arc furnaces. The only producers in North America are Carmeuse operations in Dundas, Ontario and Millersville, Ohio and a LWB (Lhoist) operation in York, Pennsylvania (*Industrial Minerals*, February 2005).

In January 2005, the Carmeuse Group of Belgium completed the purchase of Lafarge SA's 40% interest in Carmeuse North America (CNA) for US$140 million. Carmeuse and Lafarge formed CNA in 1998 with the combination of their North American lime operations. CNA is a producer of lime and limestone products and operates 14 plants in Canada and the United States, including 2 in southwest Ontario, which have a combined annual capacity in excess of 8 Mt (Blendon Information Services, January 2005; *Industrial Minerals*, February 2005).

In April 2005, Carmeuse Group announced plans for a significant capital expenditure and capacity expansion program for CNA. The program is in response to continued high demand for lime from the iron and steel industries as well as from the soil stabilization and construction sectors. As part of the program CNA will upgrade existing hydration plants at five locations, including its Beachville Ontario plant, to better supply growing flue gas desulphurization and construction markets (Blendon Information Services, May 2005).

For the first half of 2005, CNA reported sales increased by 7%, reflecting combined increases of tonnage sold in crude and burnt products and higher prices. CNA revenues increased to US$268.9 million and operating profit jumped to US$20.1 million. The company recorded higher sales volumes and prices through much of the period, but noted a reduction in lime demand from the steel industry late in the second quarter. A cut back in steel production is expected to impact CNA operations where Mittal Steel, who announced a cut of half million tons of steel production, is its largest customer. However, the company notes that it has had some success in developing new markets, notably in the soil stabilization and construction markets (Blendon Information Service, September 2005).

CNA business activity during the third quarter of 2005 experienced the slowdown of the steel industry. The net turnover increased by 5% to US$389.6 million over the equivalent period of last year due mainly to increased sales unit prices and better product mix (www.carmeuse.be, report dated December 2005).

Dimension/Building Stone

In 2005 in the Southwest Ontario District, materials for dimension, building and landscape stone uses were extracted from 28 quarries operated by 21 companies (see Figure 1). A limited number of these quarries also extracted stone that was crushed and used as aggregate. The primary market for stone is southern Ontario and the Great Lakes region of the United States, with limited products being shipped to more distant markets.

Quarries extracting limestone, dolostone, sandstone and gneiss for dimension, building and landscape stone use, and associated on-site processing plants, employed approximately 500 people in southwestern Ontario in 2005, including more than 400 employees in the Wiarton - Owen Sound area. (Personal communication with most quarry owner/operators, 2005).

Many stone quarry operators indicated that the demand for stone outstripped supply in 2005, particularly those supplying Eramosa Member dolostone ("marble") and Whirlpool Formation ("Credit Valley") sandstone. Many of these operators reported 2005 as a "good year" and "cannot meet demand". In 2005, many stone producers purchased new extraction and processing equipment, and a number constructed new on-site buildings.

WIARTON AREA QUARRIES

The largest concentration of dimension stone producers in the Southwest Ontario District or the Province, is in the Wiarton area where 14 operations extracted Eramosa Member dolostone for dimension, building, landscaping and flag stone markets, 2 operations quarried Amabel Formation dolostone for dimension and buildings stone uses and one quarry produced Guelph Formation dolostone for building and landscape stone sales.

In 2005, Ted Young was issued license to extract Eramosa stone in Keppel Township. During the year only preliminary site work was done and currently the owner is seeking a party to lease/operate or purchase the property

Owen Sound Ledgerock Ltd., the largest stone quarrying and processing operation in Ontario, cut and polished Eramosa Marble and other dimension stones using over 100 large-format stone-cutting machines. The company started full production of a tile-line in 2005. During the year Owen Sound Ledgerock completed a new corporate headquarters at the Owen Sound Quarry location. The company operates 3 Eramosa stone quarries and an Amabel Formation dolostone quarry (marketed as "Hope Bay") in the Wiarton area. The company also has supply arrangements with quarries in the Orillia area and on Manitoulin Island to obtain "Mara" and "Silverwater" marbles. In 2005, the company quarried more than 50 000 t of Ontario building and imported over 1 Mt of stone to process (S. McCallum, Owen Sound Ledgerock Ltd., personal communication, July 2005).

Arriscraft International Inc. operated the Adair Marble Quarry just north of Wiarton. Blocks of Amabel Formation dolostone are extracted and either processed on-site or transported to the company's Cambridge Ontario processing plant. Annual capacity exceeds 30 000 t of quarry blocks suitable for up to 60 000 m^2 of slabs and cut stone products. The quarried stone is used for both horizontal and vertical building and landscaping elements.

Limberlost Stone Inc. started operations of an Eramosa Member quarry in Albemarle Township in 2003, and in 2005 will ship up to 10 000 t of material. The company supplies light brown, dark brown and grey dolostone as cut and random flagstone, landscaping stone, building stone, coping and coursing. The company has applied for an expanded quarry license (D. McCutcheon, Limberlost Stone, personal communication, July 2005).

SANDSTONE QUARRIES

In the Georgetown–Inglewood area, white and maroon Whirlpool Formation sandstone was extracted at the Deforest Brothers Quarry, Rice & McHarg Quarry, and Hilltop Stone and Supply Quarry for the production of squared and irregularly shaped dimension and landscaping stone. The combined output from these 3 small-scale quarries is less than 10 000 t of stone annually.

ORILLIA AREA QUARRIES

In the Orillia area, Gull River Formation limestone was extracted for sale as building and landscape stone by 6 companies: Rockleith Quarry Ltd.; Speiran Quarries Ltd.; Cut Above Natural Stone; Stone Cottage Inn Ltd., MAQ Aggregates and James Lamb. At the Rama Stone Quarries Ltd. property, Fowler Construction quarried gneiss for landscape stone, and crushed stone for premium-quality and specialty aggregate.

In 2005, Owen Sound Ledgerock Ltd. continued to take quarry blocks from the Stone Cottage Inn Ltd. property for processing into tiles and other products at their Owen Sound plant.

Rockleith Quarry Ltd. commenced quarrying in 2002. In 2005 the company significantly increased its quarrying and stone processing capacities. Rockleith is developing new products including thin veneer wall stone, which was highlighted at the MNDM display at StonExpo 2005 (D. Simpson, personal communication, September 2005)

Both the Speiran Quarries and the MAQ Aggregates quarries are operated by Gott Natural Stone '99 Inc. The MAQ Aggregates–Hewitt Property Quarry was first opened in 2004. As of September 2005, a large area of the surface weathered stone to a depth of approximately 1 metre has been extracted.

Aggregate

Aggregate is a major mineral commodity produced in southwest Ontario. The buoyant economy of southern Ontario is producing strong demand for both crushed stone and sand and gravel aggregate products.

In May/June 2005, *Aggregates & Roadbuilding* published their annual listing of Canada's top 20 stone quarries. For 2004, 8 of Canada's top 20 quarries were located in the Southwest Ontario District. All are primarily aggregate quarries with the exception of the Beachville Quarry, which supplies high-purity limestone for the chemical, metallurgical and environmental industries. The Southwest Ontario quarries, showing ranking and 2004 and 2003 production figures, are as follows

CANADA'S TOP 20 QUARRIES

Quarry Name, Operator and National Ranking	2003 Production Mt	2004 Production Mt
3. Dundas Quarry – Lafarge Canada	4.25	4.76
4. Milton Quarry – Dufferin Aggregates	4.71	4.04
7. Acton Quarry - Dufferin Aggregates	2.46	3.08
8. Brechin Quarry – Lafarge Canada	1.76	2.23
11. Beachville Quarry – Carmeuse Lime (Canada)	1.69	1.93
12. Burlington Quarry – Nelson Aggregate	1.83	1.90
18. Thorold Quarry – Walker Industries	n/a	1.30
20. Flamborough Quarry – Dufferin Aggregates	n/a	1.17

(*Aggregates & Roadbuilding*, May/June 2005)

The main rock formations quarried for crushed stone aggregate are Gull River, Bobcaygeon, Lockport, Amabel, Guelph, Bois Blanc, Dundee, and Lucas. The major crushed stone source areas are along the Niagara Escarpment and east of Lake Simcoe. Most of the production is trucked to local major urban centres.

Sand and gravel is also a major mineral commodity produced in southwest Ontario. The major sand and gravel source areas include along the Oak Ridges Moraine, and outwash deposits within Caledon and Puslinch townships, and between Cambridge and Brantford. Most of the material is trucked to local major urban centres.

COMPANY AND INDUSTRY NEWS

Early in 2005, the Swiss cement maker Holcim Ltd., the world's second-largest cement maker and parent company of St. Lawrence Cement and Dufferin Aggregates, announced that it is considering making an offer for all of the outstanding shares of Aggregate Industries plc of England for £1.78 billion (US$3.34 billion). Aggregate Industries had sales of £1.44 billion (US$2.70 billion) in 2003, of which 43% was accounted for by its U.S. construction materials operations. Holcim had net sales of CHF 12.6 billion (US$10.6 billion) in 2003, of which about 20% were generated in North America (Blendon Information Services, January 2005; *Industrial Minerals*, February 2005). By mid-year, Holcim had acquired 100% of Aggregates Industries plc. The deal helps Holcim to diversify from cement and gives it a UK presence and expands its U.S. business (Pit & Quarry, June 2005; Blendon Information Services, July 2005).

In early 2005 Dufferin Aggregates released a proposal to triple production at it's Flamboro Quarry, according to The *Hamilton Spectator*. Dufferin told the newspaper that the activity reflects growing demand for aggregates in the Greater Toronto Area, as well as shrinking reserves in nearby quarries (www.aggman.com/articles/jul05sbs.htm).

Aggregate resources within the Toronto region made the press numerous times in 2005; usually, as they relate to land use planning and the need to licence new resources and develop new quarries as the reserves of long-established operations become exhausted. Some examples of "aggregates in the news" include

- "Between a rock and a hard place - From this moonscape, carved 27 metres into the ground, springs the lifeblood of the GTA development boom. .... This is Lafarge Corp.'s flagship Ontario limestone quarry in Dundas, third biggest in the province, according to an industry publication. Some of Canada's biggest quarries and gravel pits pock the land west

and north of Toronto, and close to the GTA municipalities that need the sand and rock for roads and buildings. . .. Yet Lafarge and other major producers have never felt more misunderstood. ....This year, the APAO has stepped up its public relations efforts, and this month will run ads in newspapers that underscore the need for aggregates. ...There is urgency to the public relations push, according to many in the business. They say the current limestone supply — the sturdy rock is increasingly required by contractors, producers claim — is fast running out while housing development, public opposition to new sites and a battery of environmental protection laws are crimping access to plentiful resources on the Niagara Escarpment and Oak Ridges Moraine. Finding sources further out is unappealing because that means more fuel and environmental costs to haul the product greater distances. ... Not everyone accepts this stance." (*Toronto Star*, October 3/2005)

- "Running out of gravel and rock – But what is the true state of our aggregate resources?" by Gord Miller, Environmental Commissioner of Ontario (*Toronto Star*, January 5, 2005)
- "Aggregate Producers Leaving minimal impact – Ontario must consider preserving environment while not jeopardizing hard-won economic gains" by Carol Hochu, Aggregate Producers Association of Ontario, letter in (*Toronto Star*, January 12, 2005)
- "Proposed greenbelt law favours gravel pits, study warns" (*Toronto Star*, January 25, 2005)
- "Reduce demand for aggregates" Mark Winfield, The Pembina Institute, letter in (*Toronto Star*, January 26, 2005)
- "Striking a note for the escarpment – Singer joins fight over Niagara Escarpment pit. Sarah Harmer opposes quarry expansion - The Juno-winner is adding her profile to a battle to stop the 80-hectare expansion of a 220-hectare limestone quarry near her parent's farm on the escarpment just north of Burlington. Proceeds from her single release *Escarpment Blues* goes toward financing Protecting Escarpment Rural Land in its opposition to the quarry expansion proposed by Nelson Aggregates." (*Toronto Star*, August 20, 2005)

The Aggregate Producers' Association of Ontario (APAO) announced in 2005 that it is changing its name. As of January 1, 2006, the industry group will be called the Ontario Stone, Sand and Gravel Association. The change is being made as one of the ways the APAO can better address its public perception challenges. A new tag line – Essential Materials for Building a Strong Ontario – will be used in conjunction with a new logo that is currently in the design stage (*Aggregates & Roadbuilding*, September-October 2005).

The City of Burlington received APAO Bronze Plaque Award on October 25, 2005 for outstanding rehabilitation of the Kerncliff Quarry. This site was reshaped with the help and dedication of many local groups and volunteers, including the Conservation Halton, City of Burlington, Management of Abandoned Aggregates Properties Program (MAAP), the APAO, Nelson Aggregates and the Bruce Trail Association. The chairman of Conservation Halton added "I know it will be enjoyed in perpetuity, Kerncliff Park demonstrates that extraction is an interim land use. Land rehabilitation is effective at creating needed green space" (*Aggregates & Roadbuilding*, November-December 2005).

The Greater Toronto Area (GTA) is Canada's largest aggregate market, consuming some 60 Mt annually. Virtually all of this material is transported by truck, representing more than 1.7 million loads, not counting backhauls. With an estimated total distance driven to deliver the GTA's annual aggregate consumption being pegged at over 200 million km, it is easy to see how higher fuel costs are going to have an increasing influence on future aggregate prices, not only in the GTA but elsewhere across Canada. Fifty-six percent of the GTA's current annual aggregate consumption is supplied from within the GTA, with the balance being imported from elsewhere in Ontario (*Aggregates & Roadbuilding*, November-December 2005).

ADVANCED EXPLORATION AND DEVELOPMENT

With the advanced exploration, development and permitting work done in 2005, up to 3 new or re-activated mineral extraction operations could start production in 2006. In the following sections, a selection of projects is highlighted.

Shale/Brick

Hanson Brick Ltd. has applied for a license to open a new Queenston Formation shale quarry off Tremaine Road and immediately north of Highway 407, within the City of Burlington. This location is approximately 4 km by road from the company's two Burlington Brick Plants. The 38.5 ha site has an estimated 13 to 14.5 Mt of accessible resource. As of January 2006, rezoning requirements with the City of Burlington have been completed, and discussions continue with the Region of Halton and the Ministry of Natural Resources on issues regarding obtaining an Aggregate License.

Aggregate

Two companies on the western edge of the Greater Toronto Area have started applications for new zoning and then licenses to extract Amabel Formation dolostone for high-quality aggregate products. Both are "green field" sites. Lowndes Holdings Inc. has a 154 ha quarry site within the northeast corner of the City of Hamilton, and with approvals would extract 3 Mt annually. James Dick Construction Ltd. proposes to extract 2 Mt per year from its Town of Caledon location.

In 2005 Dufferin Aggregates won regulatory approval to expand its quarry in Milton, allowing another 12 years of operations. The company announced a regulatory board from the Ontario Municipal Board and the Environmental Review Tribunal approved the 83 ha extension (*Toronto Star*, June 11, 2005). Subsequently, two Niagara Escarpment watchdog environmental groups appealed the decision. Under the environmental process, the Ontario cabinet considers appeals from joint board decisions. Therefore the Premier and the provincial cabinet will make the final decision. A ruling is expected within a number of months (*The Globe and Mail*, July 15 2005).

Nelson Aggregate Co., a partnership between Lafarge Canada Inc. and Steed and Evans Holdings Inc., has applied for a licence for a 82 ha expansion of its Burlington Quarry.

In 2005 Harold Sutherland Construction Ltd. submitted an application seeking an amendment to the Niagara Escarpment Plan in Keppel Township to change lands designated Escarpment Rural to Mineral Resource Extraction. This would potentially allow a 88.9 ha, 600 000 t per year quarry adjacent to the company's existing quarry across County Road 17.

High-Calcium Limestone

Fortune Minerals Limited/Formosa Environmental Aggregates Ltd. owns 107 ha in the Municipality of Brockton in South Bruce County, underlain by patch reefs within the Amherstburg Formation. Formosa intends to develop the Greenock Quarry on its property to mine a resource grading 99% calcium carbonate. The company has received all the requisite Official Plan and zoning amendments. As of January 2006, discussions between Fortune Minerals Limited/Formosa Environmental Aggregates Ltd. and the Ministry of Natural Resources continue with regard to the site plan and other issues. An extraction license has yet to be issued.

Federal White Cement is the only manufacturer of white portland cement in Canada. The company currently holds a licence in Zorra Township to extract high-calcium limestone. No extraction has taken place within this licence as the company chooses to purchase raw materials from local quarries. Recently, the company applied for an expansion of their licence. This application has been reviewed by an Ontario Municipal Board panel, and licencing decisions are awaited.

Dimension/Landscape Stone

Proponents of several dimension/building stone projects have started the licencing process under the Aggregate Resources Act. These projects include Gull River Formation limestone quarries in Rama Township, applications to quarry Eramosa Member dolostone/marble in Albemarle and Amabel townships, and Guelph Formation dolostone quarries in Lindsay Township. These applications and projects are at varying stages within the licencing process.

Some of applications, currently within the formal process, include (proponent, location, and commodity)

- John DiPoce, Rama Tp., limestone
- Stone Cottage Inn Ltd., Rama Tp., limestone
- Everest Nurseries, Amabel Tp., dolostone
- Bruce Peninsula Stone Ltd., Albemarle Tp., dolostone
- Limberlost Stone Inc., Albemarle Tp., dolostone
- D. Pruder, Amabel Tp., dolostone

Cement Stone

St. Marys Cement Inc. has applied to amend the current site plan at its Bowmanville Quarry. The application has been made to allow a lowering of the final elevation of the quarry floor from 11.0 m above sea level to a depth of 113.0 m below sea level. The current quarry is approximately 66 m deep, with 10 m of overburden overlying 56 m of Lindsay Formation limestone. If approved, the quarry would have a final depth of 188 m and provide approximately thirty additional years of feed for the on-site cement plant. As of January 2006, the Ministry of Natural Resources and other agencies are reviewing and commenting on the application.

EXPLORATION ACTIVITY

All exploration activity in the Southwest Ontario District occurs on private land, hence there is no requirement for companies or individuals conducting mineral exploration to file assessment reports with the Ministry of Northern Development and Mines or to contact the Southwest Ontario District Geologist Office. Through informal discussions and research, however, staff of the Southwest Ontario District Geologist Office acquires information on most property acquisition interests or exploration projects for such commodities as high-purity limestone/dolostone, salt, gypsum, sandstone, limestone/dolostone/marble, dimension/building stone, cement, shale and zinc.

Numerous companies and individuals contacted the Southwest Ontario District Geologist Office throughout 2005 for information and/or advice with respect to exploration areas, commodities, processes for acquiring mineral properties and exploration opportunities. Confidentiality and private land issues surrounding the competitive and market-driven nature of the industrial minerals industry impedes disclosing the identities of companies and/or individuals exploring in southwest Ontario and/or the locations of their prospects. Most exploration centres on the commodities that are currently experiencing strong market conditions, including aggregate, dimension/building stone, shale/brick, cement, limestone and dolostone.

HudBay Minerals Inc., known prior to December 2004 has OntZinc Corporation, has an exploration project for Mississippi Valley-type "MVT" zinc mineralization in Southwestern Ontario. HudBay Minerals holds approximately 10 500 ha of mineral leases for this project. The company drilled one inconclusive drill hole in 2004. In early 2006, the company will be evaluating a plan to continue this exploration project (C. Fiebelkorn, Hudson Bay Mining and Smelting Co. Ltd., personal communication, December 2005).

MINES AND MINERALS INFORMATION CENTRE (MMIC) AND DISTRICT GEOLOGIST STAFF AND ACTIVITIES

During 2005, C. Lee staffed the Mines and Minerals Information Centre (MMIC), with support from K. Steele and M. Barua of the District Geologist's Office. The Southwest Ontario District Geologist Office is co-located with MMIC. C. Lee, Regional Support Geologist for Southern Ontario, supplied lead service for MNDM's online information system, the Earth Resources and Mineral Exploration Web site (ERMES), and for MMIC library functions and Publication Sales.

K. Steele, Southwest Ontario District Geologist, provided expertise regarding the geology, resources, and minerals industry in Southwest Ontario with the assistance of M. Barua, the Southwest District Support Geologist. All publicly available geological files, mineral deposit records and reference materials for the Southwest Ontario District are available for viewing at the MMIC.

Through the summer, student assistants served clients at the MMIC and provided research assistance and support to public outreach projects conducted by MMIC and the Southwest Resident Geologist Program. Summer student assistants in 2005 were A. Khan and E. Leitgeb (Ontario Summer Experience Program) and V. Drolet (Ontario–Quebec Summer Exchange Program).

During 2005, MMIC and Southwest Ontario District staff assisted approximately 4500 clients who visited or contacted MMIC/Southwest District office, as well as dialogued with an estimated additional 1500 clients at various conferences and trade shows.

Staff responded to a wide variety of inquires within the general categories of commodities, topics and geographic areas. Inquiries are outlined below grouped by frequency.

Commodities

Frequent: limestone, gold, uranium, diamond/kimberlite, nickel, platinum, dimension stone, aggregates, peat, iron, copper, shale/brick, oil & gas, lignite

Common: silver, cement, molybdenum, landscape stone, brucite, lime, calcium, oil shale

Occasional: mercury, titanium, nepheline syenite, basalt, mica, amethyst, sodalite, magnesium, magnesite, pumice, calcium carbonate, asbestos, marble, apatite, rose quartz, coal, talc, calcium hydroxide, salt, kyanite, niobium, phosphate, vermiculite

Topics

Frequent: prospector's license, old mining stock certificates, mining lands, ARIP, surface rights, air photos

Common: claim tags, aeromag maps, Geoscape Toronto, mineral statistics, water wells, aggregate operations/Aggregate Resources Act, mineral kits, fossils

Occasional: places to buy rocks/minerals in Toronto, MDI, Georgian Bay Formation, James Bay Lowlands, mineral collecting sites in Ontario, Dundalk plateau/plain, mining equipment for sale, Oak Ridges Moraine, film location ideas, petroleum resources, Whirlpool Formation sandstone, Dundas shale, earthquakes, geotourism, radon gas, Niagara Escarpment, salt leases, drill holes, abandoned mines, drift thickness, Queenston Limestone

Areas

Frequent: Attawapiskat, Bancroft, Brampton, Chapleau, Elliot Lake, Fort Hope, Kapuskasing, Kenora, Kirkland Lake, Parry Sound, Red Lake, Sault Ste Marie, Sudbury, Thunder Bay, Timmins

Common: Barrie, Bruce Peninsula, Cobalt, Georgetown, Guelph, Haliburton, Hamilton, Iroquois Falls, Kaladar, Killarney, Kingston, Madoc, Manitoulin Island, Marmora, Michipicoten, Muskoka, Niagara, Orangeville, Peel region, Peterborough, Pickle Lake, Rainy River, Shinning Tree, Temagami, Toronto, Uxbridge, Wawa, Wiarton, Windsor, Winisk Lake

Industry Interaction

District staff participated in a number of industry organizations, field trips, publications, conferences, trade shows and meetings in 2005.

The District Geologist attended a number of CIM Toronto Branch events during 2005, including: January students dinner, February lunch meeting where Mario Caron, Tiberon Minerals Ltd. spoke on "Tungsten and Fluorspar from a World Class Deposit", May lunch meeting, where C. Newall of First Quantum Minerals spoke on "Building Tomorrows Copperbelt, Today", November lunch meeting where Phil du Toit from Voisey's Bay Nickel Co. Ltd. provided "An update on development and First Production at Voisey's Bay", the Sandvik Mining and Construction & CIM Toronto Branch 81st Annual Oyster Night, December lunch meeting where Jochen Tilk, President and CEO of Inmet Mining Corporation presented "Inmet Mining–Past, Present and Future".

The Regional Support Geologist attended a number of Toronto Geological Discussion Group (TGDG) presentations throughout the year.

Landscape Ontario Congress—In January, the District Geologist had opportunity to visit the trade show portion of Landscape Ontario Congress in Toronto. The visit concentrated on stone producers and stone distributors, particularly those with Ontario stone. Ontario stone companies exhibiting included: Northern Natural Stone, John Eiseh Natural Stone Products, Colonial Brick & Stone Inc., Upper Canada Stone Company, Limberlost Stone Inc., The Brickyard of Canada Inc., Ebel Quarries, Consport Inc., Mar-Co Clay Products, Stonemen's Valley Inc., Rock Valley Natural Stone, Commonwealth Brick and Building Supplies Ltd., Hutcheson's Sand, The Pebbleman Natural Stone, McLaren's Bay Mica Stone Quarries.

Aggregate Producers Association of Ontario–The District Geologist attended the APAO 2005 Annual General Meeting, February 24-25, in Ottawa. Approximately 300 attended the meeting, representing aggregate producers, consultants, suppliers, government, and associations. The program consisted of technical presentations, keynote and special guest speakers, commercial exhibits, and luncheons. The meeting was an excellent venue to obtain a summary of recent industry events, issues, and activities as well as investigate issues that will impact the industry, government and society within the coming years.

Prospectors and Developers Association of Canada annual convention–At the 2005 PDAC annual convention in March in Toronto, the District Geologist staffed Resident Geologist Program display for assigned shifts, toured MNDM Policy Secretariat staff through the convention, and assisted with CIM Toronto Branch initiative to tour university students through the trade show.

Canadian Institute of Mining and Metallurgy – The CIM annual national meeting and trade show "Toronto Rocks!" was held May 24-27, 2005 in Toronto. Southwest District and MMIC staff participated in the following ways.

- Mining in Society Show–The MNDM display entitled "Geology and Minerals in the Toronto Area and YOU" that was designed, constructed and staffed by the District Geologist and Support Geologist, was well received and visited by the public during the three-day event. Many who visited the display did not realize the everyday products that come from mining, how close operating mines are located to Toronto, and the value of mineral production in southern Ontario. Over 1000 rock and mineral samples from across southern Ontario were given away.
- Mining in Southern Ontario Technical Session–The District Geologist presented a paper entitled "An Overview of Mining, Exploration and Development in Southern Ontario". The paper was co-authored by the Regional Resident Geologist–Southern Ontario and the District Geologist–Southeast Ontario. This paper served as an introduction to the session. Other papers in this session included: "An operational overview of the Sifto salt mine", by Kevin Cassidy of the Goderich Mine; and "Challenges to aggregate extraction in southern Ontario", by Carol Hochu of the Aggregate Producers Association of Ontario.
- Field trip–The District Geologist organized a conference field trip entitled "Mines and Wines of the Niagara Region–Industrial Minerals, Geology and Wineries of the Niagara Escarpment". Unfortunately, the trip was cancelled due to low registration.

In late April, the District Support Geologist attended a field trip to OMYA Canada's Perth operations and Tatlock Quarry organized by the Resident Geologist–Southern Ontario. Also attending were approximately 10 participants from the Southern Ontario Prospectors Association, NRCan, and other organizations. The Perth facility produces some of the highest quality calcium carbonate in the world utilizing the most innovative and efficient equipment and processes available.

In June, the District Geologist attended the annual meeting of the Association of Professional Geoscientists of Ontario.

Aggregate Producers Association of Ontario Operations Tour – The District Geologist attended the APAO 2005 Operations Tour on September 15th. Tour attendees filled three buses for a day-long tour to four operations: Fowler Construction Company Rosewarne (Bracebridge) gneiss Quarry & sand and gravel Pit; Lafarge Canada Inc Coldwater Gull River Formation limestone and dolostone Quarry; Nelson Aggregate Co. Uhthoff Bobcaygeon and Gull River formation limestone and dolostone Quarry; and Fenner Dunlop Bracebridge Conveyor Belt plant. In addition, an equipment and services show was provided over the noon-hour for tour attendees.

International Vermiculite Conference–In October, the District Geologist co-authored a presentation by the Regional Resident Geologist – Southern Ontario to an international vermiculite conference in Toronto. The presentation highlighted the geology of Ontario, the province's industrial minerals industry and services provided by MNDM in support of mineral exploration and development.

Industrial Minerals 2005–A continental breakfast/open house was hosted by MMIC staff on October 19th for the delegates of the Industrial Minerals 2005-Annual Canadian Conference on Markets for Industrial Minerals conference held in Toronto.

StonExpo 2005 Ontario Canada Stone Exhibit–The exhibit, held October 20-22 in Las Vegas was a partnership between the MNDM and McLaren's Bay Mica Stone. The Ministry highlighted the wide variety of Ontario stone producers and approximately 10 stone quarry prospects, primarily via the display of approximately 50 stone samples/tiles. Staffing the Ministry display were the District Geologist–Southwest Ontario and the Regional Resident Geologist–Southern Ontario. As reported by StonExpo organizers attendance at show was 6 271 registrants. The estimated number of attendees who visited and spent time at the MNDM display was 550, including visitors from 4 provinces, 35 states and 4 other countries. A total of 275 Ontario Stone Directories were distributed. Materials for distribution were provided from: Arriscraft International, Attia Quarries and Rockleith Quarries. Ontario Producers who attended the show were: McLaren's Bay Mica Stone, Arriscraft International, Bruce Peninsula Stone, Attia Quarries and Rice & McHarg Ltd.

Mining Industry and Geoscientist Career Promotion – In November the District Geologist exhibited a display at the Haldimand - Norfolk Youth Career Fair. The event targeted grade 10 students from ten area high schools. Over 500 students attended and approximately 20 teachers and guidance councilors received information and materials from the exhibit. The display highlighted geosciences and mining industry careers. The mining industry portion of the exhibit focused on the newly published book *RockON – Career opportunities in Ontario's mining industry*, a co-operative effort produced by the Ontario Mining Association, the Mining Industry Training and Adjustment Council (MITAC), mining companies, government, post secondary institutions and industry associations. The geosciences career portion provided materials made available via Canadian Geoscience Council's "*Careers in Geoscience*" CD and the Association of Professional Geoscientists of Ontario's *"Interpretation, Explanation and Examples of Professional Geoscience"* brochure.

In November, the District Geologist and Regional Support Geologist attended a lecture at the University of Toronto Geology Department. "The Diamond Fields of Canada" was presented by Dr. Bruce Kjarsgaard of the GSC.

Ontario Exploration & Geoscience Symposia–The District Geologist attended this event sponsored by the Ontario Prospectors Association (OPA) that was held in Toronto in December. The District Support Geologist attended one day of the event. In addition to contributing to and staffing the Resident Geologist Program display, staff attended approximately 12 presentations and reviewed all exhibits and posters.

Property Examinations and Company Contacts

Mine, quarry, property and site visits are part of the ongoing responsibilities of the Resident Geologist Program to monitor current mineral activities, document known mineral deposits and occurrences, and identify areas of high mineral potential. Site visits also provide useful information for application to land use planning processes.

In 2005, site visits conducted by Southwest Ontario District staff focused on the following 6 topic areas:

- to acquire information from mineral industry operations who produce commodities that are currently in high demand, have potential for higher demand in the near future, and/or have production or marketing issues;
- to visit prospective, proposed or developing mineral properties;
- to investigate mineral sites with current or potential land-use conflicts;
- to acquire information for subsequent field trip visits;
- to obtain information to update records contained within the Mineral Deposit Inventory (MDI) database; and
- to obtain information, samples or marketing materials for use in the Ministry exhibit at StonExpo 2005

There are 47 industrial mineral and dimension stone operations and approximately 40 aggregate quarries active in the Southwest Ontario District. During 2005, the District Geologist made contact with almost all industrial mineral and dimension stone producers. The District Geologist and/or District Support Geologist visited 16 mines, quarries or mineral extraction sites, mineral processing plants, development sites and prospects across the Southwest Ontario District (Table 3). In addition, the District Support Geologist visited a site outside of the Southwest District. The District Geologist made field stops a number of geological sites, including Bleasdell (erratic) Boulder at Glen Miller, and significant outcrops of the Gull River, Bobcaygeon, Manitoulin and Guelph formations. Site visits provided information on commodities, mineral deposits, local and regional geology, extraction techniques, processing, products, markets, production and economic statistics and issues.

Land Use Planning Activity

The District Geologist was involved in a number of land use planning initiatives in 2005.

For approximately the past 5 years, and continuing through 2005, the District Geologist has provided technical advice in a process to further delineate and designate shale resources in the northwest Brampton area for potential future extraction. The District Geologist, working with staff from the Ministry of Municipal Affairs and Housing (MMAH) and the Ministry of Natural Resources (MNR), evaluated planning information from the City of Brampton and the Region of Peel on the quantity, quality and location of shale resources that should remain available for potential future extraction. This process included attending meetings with MNR, MMAH, City of Brampton, and consultants hired by landowners within northwest Brampton. The District Geologist coordinated technical reviews and comments by MNDM staff and presented these analyses in discussions with MMAH and MNR. MNDM maintains that the northwest Brampton shale resource is provincially significant and should be protected against competing land uses that would limit or prohibit the future development of this resource. Local land owners and the City of Brampton are seeking all lands in northwest Brampton for urban expansion.

> "Bid for rural land called too rushed – Brampton wants 2,400 hectares slated for housing, will hurt Credit River watershed say environmentalists - ... Lawyer Scott Snider represents the northwest Brampton landowners, including Mattamy Homes and Paradise Homes. He said it's important to make a quick decision so the course of future development in Brampton can be determined locally and not by provincial policy decisions." (*Toronto Star*, May, 20, 2005)

The District Geologist coordinated the MNDM response via MNR to MMAH to a Region of Peel Official Plan Amendment (OPA) on northwest Brampton. Subsequently, in July the provincial government represented by MMAH filed an appeal of the Region of Peel OPA to the Ontario Municipal Board (OMB) based on lack of protection of shale resources from urban expansion. The OPA was appealed by other groups for other reasons.

> "Charging that development is out of control, the Sierra Club has appealed a decision to open another 2,400 hectares of land in Brampton for housing and industry to the OMB. The appeal was filed recently by the club's Peel region group after Peel council decided on June 16 to include the additional land for development in the region's official plan. The unanimous decision came at the request of Brampton councillors" (*Toronto Star*, July 26, 2005)

Currently, the northwest Brampton shale resource issue has not been resolved, although discussions are on-going between the province and the Region of Peel.

The District Geologist participated in a number of strategic and policy initiatives including the revisions to the Provincial Policy Statements (PPS) of the Planning Act , consultations on Planning Act reform, and consultations on the Greenbelt Plan. In all cases, the District Geologist participated to ensure that geological and mineral resource information was appropriately used, and to plan for current and potential future extraction of mineral resources.

To become informed of all the changes and new initiatives with respect to the revised PPS and other recent pieces of land use planning legislation, in March the District Geologist attended MMAH-hosted "Planning Reform 2005– Partner Ministry Training" sessions in Toronto and London. The District Geologist also attended a MMAH-sponsored "Greenbelt Train the Trainer" seminar.

On Feb 21, 2005 the MMAH released the revised PPS scheduled to come into affect on March 1, 2005. The revised PPS should not significantly impact current and future mineral resources in southwest Ontario, with the exception of removing the "needs" requirement from the aggregates resources section and adding protection for areas of petroleum potential.

MMAH released the final Greenbelt Plan on February 28, 2005. The plan with respect to mineral resources, does not make any changes within areas of the Niagara Escarpment Plan or the Oak Ridges Conservation Plan, and elsewhere severely restricts urban expansions and places lesser restrictions on resource development. The one significant change is the total prohibition of aggregate extraction on the Niagara Peninsula north of the escarpment.

The Strong Communities Act 2004 that was enacted on March 1, 2005 includes the provision that planning documents and decisions "shall be consistent with" the PPS.

Within the Southwest District and, at a local scale, the District Geologist and District Support Geologist participated in a number and variety of land use planning initiatives in 2005 that included

- commenting on and supplying information to proposed changes to Official Plans of Region of Durham, Haldimand County and the townships of Melancthon, Aramanth and East Garafraxa;
- providing information on past gypsum mining operations;
- providing salt mining information and contact points to Detroit River International Crossing Project with respect to planning for a new international bridge or tunnel crossing in the Windsor area; and
- supplying information and technical analysis on Niagara Escarpment Commission's proposed amendment PH 143 – 03 to re-designate parts of the Milton Outlier.

For the past number of years, the District Geologist has been an active participant in the team building the *Geoscape Toronto* public and student education project. The *Geoscape Toronto* Team was awarded the Ontario Professional Planners Institute 2005 Ontario Planners Award for Communications & Public Education. As noted in the awards program,

> "*Geoscape Toronto* is intended to height the awareness of earth sciences among students and decision makers in order to encourage the wise use and management of natural resources. The volunteer team of planners, scientists and educators that make up *Geoscape Toronto* has created lesson plans, a colourful and informative poster, and web-based materials on the geology of the Greater Golden Horseshoe. The poster has been sent to 1,300 schools in the GTA as well as MPs, MPPs, mayors and planning directors. The jury found the poster an innovative and refreshing educational tool…well-organized and easy to comprehend; the graphics has great kid appeal".

Two of the principle team members, Victor Doyle, Planner with MMAH, and Ken Steele, District Geologist with MNDM, attended the awards dinner in Hamilton on September 29th and accepted the award on behalf of the team.

Mineral Deposit Inventory (MDI)

In 2005, the District Support Geologist continued updating the Mineral Deposit Inventory (MDI) database (OGS 2004) for the Southwest Ontario District. During the year, information for 123 records was updated. At year-end, the MDI database contained 685 records for the Southwest Ontario District.

In June, the District Support Geologist and the District Geologist attended a day-long NRVIS web-based MDI training program organized by MNR at their Peterborough office. In 2006, MNDM staff will use NRVIS to input and edit MDI records.

Education Activities

In 2005, MMIC and Southwest Ontario District staff undertook a number of public education activities related to exposing the public to geology, mineral resources, mining, safety and land use planning issues and topics. Some of the larger projects are highlighted below.

As noted previously, staff supplied and hosted the MNDM display entitled "Geology and Minerals in the Toronto Area and YOU" within the "Mining in Society Show" of the CIM annual national meeting and trade show "Toronto Rocks!" in May.

Geoscape Toronto is a poster, Web site and curriculum-correlated lessons for students that provide a set of educational tools to raise awareness of the significance of Earth Science in the Greater Toronto Area (GTA). The Web site – www.toronto.geoscape.nrcan.gc.ca – delivers ongoing and new support and reference materials, including teaching resources. The *Geoscape Toronto* project is a co-operative effort of geoscience, planning and other professional interests. It has been developed through the participation and support of federal and provincial governments, industry, and education partners. Resident Geologist Program staff has had significant involvement in the *Geoscape Toronto* project from its inception. In 2005, staff involvement included

- In May, the District Geologist assisted a *Toronto Star* writer by supplying ideas and materials for field trips in the GTA tied to the Geoscape Toronto theme panels.
- On June 11 the *Toronto Star* published a 3-page article on *Geoscape Toronto* poster/Web site/teaching activities, and its utility as a teaching tool for GTA schools. The article had two main titles *"Learning the real dirt: They call it the geoscape – the geology below and the landscape around us. Understanding it is the key to our sustainable future"* and *"The story beneath our feet"*. The MMIC received an increased number of enquiries and poster sales, most of which were from GTA schools.
- *Geoscape Toronto*'s poster and school curriculum won the Canadian Institute of Planners 2005 Award of Excellence in the category of environmental planning. The award was presented at the CIP conference in Calgary in July, where Victor Doyle, one of the lead authors of the project, accepted on behalf of the *Geoscape Toronto* team.
- As noted earlier, in September, the *Geoscape Toronto* Team was awarded the Ontario Professional Planners Institute 2005 Ontario Planners Award for Communications & Public Education
- The District Geologist edited aggregate resources lesson plan and learning activities for posting to the *Geoscape Toronto* Web site

During the summer, the District Geologist, as part of the Prospectors and Developers Association of Canada (PDAC) Education Committee and PDAC Mining Matters team, coordinated the acquisition of rock and mineral samples required by the Mining Matters project to assemble 300 grade 4 teaching kits. Nine rock and mineral sample types were required, one of which was supplied by the Timmins Resident Geologist Program office, two by the Tweed Resident Geologist Program office, and 6 from mines and quarries operating in the Southwest District.

The following companies are gratefully thanked for their in-kind donations:

1. Rice and McHarg Quarry Ltd. – sandstone
2. Carmeuse Lime Canada Ltd. – limestone
3. Unimin Canada Ltd. – quartzite
4. Hanson Brick Ltd. – shale
5. CGC Inc. – gypsum
6. The Canadian Salt Company Ltd. – halite

The District Geologist and two students assisted the Tweed Resident Geologist Program Office by staffing the MNDM display at the Bancroft Rockhound Gemboree on July 28th. The Southwest Ontario District also supplied 500 salt samples for distribution to the public.

Staff of the Southwest District exhibited a display at the University of Waterloo Gem and Mineral Show on October 29-30, 2005. The display was entitled "Geology and Minerals in Southwestern & Central Ontario and YOU". The exhibit included samples of rocks and minerals extracted in southern Ontario and products made from these commodities, as well as examples of interesting geoscience sites in southern Ontario that may be visited by the public. Over the two-day event, the exhibit was visited by an estimated 700 attendees, including approximately 400 children and students, and approximately 900 mineral samples were given away to interested children, students and adults.

Southwest District staff helped the Willowdale Gem and Mineral Club's annual show by sending display materials including brochures, posters, maps and guidebooks. The show was attended by one thousand visitors.

The District Geologist made four "Minerals in Your Life" presentations to grade 3, 4 and 5 students in the Toronto area during 2005. These presentations contained elements of an introduction to rocks and minerals and their uses, mining and the geology of Ontario, and what it is like to be a geologist. Additionally, rock and mineral samples were loaned to a number of Toronto area geologists to make similar presentations to local schools.

The MMIC provides on-going education to students and the general public via displays, posters and hand-outs.

MMIC SERVICES

The Mines and Minerals Information Centre (MMIC) is an information, research and sales office for the Mines and Minerals Division (MMD) of the Ministry of Northern Development and Mines (MNDM). The MMIC provides information, publications, data and expertise on Ontario's geology, rocks, minerals and landscape, its exploration and mining industries, as well as access to other Ministry geoscience and technical resources.

The storefront information outlet serves one of the largest groupings of geoscientists, mineral industry specialists, mining companies and mining-related service companies in the world. In addition, government professionals, university and college students and practitioners in geoscience, engineering, architecture and land use planning use the MMIC's resources and information for research.

The MMIC provides clients with computer access to Ministry of Northern Development and Mines' geoscience databases. Throughout 2005 and into 2006, this access was via the Earth Resources and Minerals Exploration Web site (ERMES) at www.ermes.mndm.gov.on.ca. In early 2006, a new geosciences portal will be available with improved access to the geoscience databases.

The MMIC also provides computer access for clients who wish to access the CLAIMapsIII database. CLAIMapsIII is updated daily by the Provincial Recording Office (PRO) and provides information pertaining to mining claims and land tenure in Ontario. In addition, maps and digital data are available for download. CLAIMapsIII can be found on the internet at www.mndm.gov.on.ca/MNDM/MINES/lands/claimap3.

Publication Sales

The MMIC houses over 10 000 Ontario geological publications available for walk-in sales. The Centre maintains a retail stock of new and old publications produced by the Ministry's Mines and Minerals Division (MMD) including

- Geology guidebooks and posters
- Geological, geochemical, and geophysical maps and reports
- Annual statistical reports
- Industrial mineral and mineral deposit circulars
- Mineral policy background papers
- Aggregate resources maps and reports
- Open file reports

Publications and digital data not available as in-stock items can also be ordered via telephone, mail, or e-mail, through the Ministry's Publication Sales Centre in Sudbury toll free at 1-888-415-9845, or electronically at pubsales@ndm.gov.on.ca.

Library Services

The MMIC library provides a selection of references and topical information on earth science and the minerals industry. Scientific journals, directories, industry periodicals, the complete collection of OGS publications dating back to 1891, and most Geological Survey of Canada (GSC) publications pertaining to Ontario are available to MMIC clients.

Tables 4 through 8 below list new publications and materials added to the MMIC library during 2005: Table 4 – geoscience and mining newsletters; Table 5 – journals and periodicals; Table 6 – Geological Survey of Canada publications; Table 7 – Ontario Geological Survey publications, with particular reference to southern Ontario; and Table 8 – reference materials.

The library also compiles topical papers and articles acquired by staff at meetings or from publications to which the library does not subscribe. Reports from exploration and mining companies in Ontario are also collected and available for MMIC clients. Library holdings are searchable via an in-house computer database. Clients may request inter-library publication transfers from the Sudbury-based Geoscience Library to the MMIC or from other Ministry offices.

In 2005, the Ministry of Natural Resources closed their customer service office in the Queen's Park complex. MNDM agreed to provide a temporary viewing facility for the MNR Forest Management Plans (FMP) in the MMIC library. Starting from July, MMIC staff received and filed more than 160 boxes of FMP and helped MNR clients to view enclosed maps and reports.

Rock and Mineral Displays

The Mines and Minerals Information Centre has a comprehensive rock and mineral collection with numerous samples on display and archived as resource material. A notable portion of the collection highlights and promotes Ontario's industrial mineral sector. Ontario diamond and base and precious metal deposits are also represented. The walls, counter, and floor of the MMIC facility showcase the natural beauty and variation of Ontario dimension stone.

OGS ACTIVITIES AND RESEARCH IN SOUTHWEST ONTARIO

The Ontario Geological Survey (OGS) Sedimentary Geoscience Section conducted a number of projects or initiatives in the Southwest Ontario District in 2005. A complete summary of each project is available in the OGS 2005 Summary of Field Work, Open File Report 6172 (Baker et al. 2005).

Three significant projects for the Southwest Ontario District were

- Aggregate Resources Inventory Mapping in Ontario: A GIS-based Approach by G. Gao, F. Brunton, J. Shirota and S. van Haaften.
- Regional Industrial Minerals and Diagenetic Study of the Guelph, Eramosa, and Amabel Formations, Southwestern Ontario by F. Brunton, L.-K. Dekeyser and M. Coniglio.
- Updated Guide to Subsurface Paleozoic Stratigraphy of Southern Ontario by D. Armstrong and T. Carter in partnership with MNR, GSC and the Ontario Oil, Gas and Salt Resources Library. This project will be published as an OGS report in 2006. The project, which began in 2004, focuses on a regional stratigraphic synthesis. Key deliverables will include descriptions of each stratigraphic unit and practical criteria for the identifying and selecting formation contacts; descriptions of regional trends in thickness, lithology and facies; lithologic logs of reference well cuttings or cores; formation top picks based on geophysical and geological logs for each reference well; lithologic descriptions of reference outcrops; and regional cross sections.

In 2005, OGS Sedimentary Geoscience Section staff was involved in a number of studies in documenting and evaluating groundwater resources in southern Ontario. Projects included

- Three-Dimensional Modelling of Quaternary Deposits in Waterloo Region, Ontario: A Case Study Using Datamine Studio Software by A. Bajc and M. Newton;
- Three-Dimensional Modelling of Thick Quaternary Deposits in the Barrie Area, Central Ontario by A. Burt and D. Russell;
- Karst in Southern Ontario by F. Brunton, J. Dodge and J. Shirota;
- Bedrock Topography and Drift-Thickness Maps, southern Ontario by J. Shirota, F. Brunton and R. Kelly;
- Paleozoic Geology Map of Southern Ontario by J. Dodge, D. Armstrong and R. Kelly;
- An Investigation of Buried-Valley Aquifer Systems in the Area North of Lake Ontario by S. Davies and S. Holysh;

- Karst Delineation and Sinkhole Investigation in the Ausable Bayfield Conservation Authority Watershed and Surrounding Area by J. Hurley, A. Merry, F. Brunton, S. Wadley and D. Abbey;
- Groundwater Resource Project for the Halton Area Watershed, Southern Ontario by D. Gale and P. Sarvas;
- Conceptualization and Calibration of a Three-Dimensional Groundwater Flow Model for Watersheds in Southwestern Ontario by A. Merry and L. Nicks.

RECOMMENDATIONS FOR EXPLORATION

The economic conditions of mineral commodities produced from the Southwest Ontario District have not changed significantly for the past number of years. All commodities are in strong or steady demand. Therefore, the recommendations for exploration presented in previous Reports of Activities continue to be valid. These include exploration for and investigations of

- High-quality crushed stone aggregate for the Greater Toronto Area (GTA) market – in *Report of Activities 2002* (Steele and Barua 2003).
- High-purity limestone and dolostone – see below and in *Report of Activities 2002* (Steele and Barua 2003).
- Queenston Formation shale – in *Report of Activities 2002* (Steele and Barua 2003).
- Eramosa dimension and landscape stone, and Gull River limestone dimension and landscape stone – in *Report of Activities 2001* (Steele and Barua 2002).
- Access to Great Lakes Markets – in *Report of Activities 2000* (Steele 2001).
- Multiple Commodities – in *Report of Activities 2000* (Steele 2001).
- Sylvania Formation silica sand – in *Report of Activities 2000* (Steele 2001).

The selection of mineral deposits not being mined in the Southwest Ontario District presented in Table 9 are also viable exploration targets.

The recommendation for exploration for High-Purity Limestone and Dolostone in Southwestern Ontario was updated by the District Geologist in 2005 and is presented below.

High-Purity Limestone and Dolostone in Southwestern Ontario

Market/Use: Carbonate rocks are widespread across southwest Ontario and provide raw material for many industries and uses, including lime, chemical and metallurgical stone, environmental applications, fillers, cement and construction aggregates. Exploitation and development of these rocks are dependent upon chemical composition, market demand, transportation infrastructure and proximity to markets. Projections suggest that there is a growing future market for high-purity limestone and dolostone, particularly for steel manufacture, environmental, chemical and filler uses.

Areas: One target source for high-purity limestone is the Formosa Reef complex of the Amherstburg Formation. The bioherms consist of hard, very fossiliferous and very pure limestone (99% calcite or 55.5% CaO). The Formosa Reef complex of the Amherstburg Formation outcrops in Greenock and Culross townships (Feenstra and Wilson 1996).

A target source for the production of high-purity dolomite and calcined products, and already supplying products to the steel industry, is the Guelph Formation. The bank reef complex and inter-reef depositional environments within the Guelph Formation form good targets for very high-purity dolomite deposits (Kelly 1996). Analyses of Guelph Formation drill core indicate intervals of extremely pure, nearly 100% dolomite. A regional assessment of the Guelph Formation dolostone purity by Dow Chemical USA of Ludington, Michigan, throughout parts of the Bruce Peninsula during the early 1990s has revealed encouraging magnesium values (21.8% MgO), combined with low averages for impurities such as SiO_2, Fe_2O_3 and Al_2O_3 (averaging 0.03%) (Feenstra and Wilson 1996).

The Ontario Geological Survey is currently undertaking investigations into the industrial mineral potential of the Guelph Formation, including the analyses of over 500 samples (Brunton and Dekeyser 2004). Preliminary laboratory results confirm a regional geochemistry consistency, whereby magnesium weight percent values average 21.4% and calcium values average 30.2%. Impurity values are consistently low. Areas of Guelph Formation with potential for quarry development include the northern Bruce Peninsula, the Beachville–Ingersoll region, and lands between Owen Sound and Woodstock.

ACKNOWLEDGEMENTS

The authors would like to thank all mineral producers across southwest Ontario who provided access to their operations or supplied information throughout 2005. Strong communication links between stakeholder groups and government ministries is essential to effective program delivery and ultimately improves the delivery of government services. The help and co-operation of Ministry of Natural Resources staff across the Southwest District is gratefully acknowledged.

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Steele, K.G. and Barua, M. 2002. Southern Ontario Regional Resident Geologist (Southwest Ontario District)—2001; *in* Report of Activities 2001, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report; Ontario Geological Survey, Open File Report 6084.

——— 2003. Southern Ontario Regional Resident Geologist (Southwest Ontario District)—2002; *in* Report of Activities 2002, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report; Ontario Geological Survey, Open File Report 6115.

Index to Figure 1. Producing mines and quarries – Southwest Ontario District, 2005

△ **Producing Mines–Salt and Gypsum**

1. Sifto Canada Inc., Goderich Mine, Goderich	rock salt
2. The Canadian Salt Company Ltd., Ojibway Mine, Windsor	rock salt
3. CGC Inc., Hagersville Mine, Hagersville	gypsum

◇ **Producing Quarries–Cement**

4. Lafarge Canada Inc., Woodstock Quarry, Zorra Tp.	limestone
5. St. Marys Cement Inc., St. Marys Quarry, Blanshard Tp.	limestone
6. St. Marys Cement Inc., Bowmanville Quarry, Darlington Tp.	limestone
7. St. Lawrence Cement Inc. Mississauga Quarry, Mississauga	shale

⬠ **Producing Quarries–Brick Products**

8. Brampton Brick Ltd., Cheltenham Quarry, Chinguacousy Tp.	shale
9. Brampton Brick Ltd., Hungry Hollow North Quarry, Williams Tp.	shale
10. Century Brick, Georgetown Quarry, Esquesing Tp.	shale
11. Hanson Brick Ltd., Niagara-on-the-Lake Quarry, Niagara Tp.	shale
12. Hanson Brick Ltd., Burlington Quarry, Burlington	shale
13. Hanson Brick Ltd., Aldershot Quarry, Burlington	shale
14. JADE Hardwoods Inc., Thedford Quarry, Bosanquet Tp.	shale

□ **Producing Quarries–Chemical, Metallurgical, Environmental and Filler Stone Products**

15. E.C. King Contracting Ltd., Sydenham Quarry, Sydenham Tp.	dolostone
16. Lafarge Canada Inc., Dundas Quarry, West Flamborough Tp.	dolostone
17. Carmeuse Lime Canada, Beachville Quarry, Zorra Tp.	limestone

○ **Producing Quarries–Dimension, Building, Landscape Stone and Specialty Aggregate Products**

18. A & A Natural Stone Ltd., A & A Quarry, Keppel Tp.	dolostone
19. Amsen Quarries Ltd., Mar Quarry, Albemarle Tp.	dolostone
20. Amsen Quarries Ltd., Wiarton Quarry, Amabel Tp.	dolostone
21. Arriscraft International Inc., Adair Marble Quarries, Albemarle Tp.	dolostone
22. Bruce Peninsula Stone Ltd., Lindsay Quarry, Lindsay Tp.	olostone
23. Bruce Peninsula Stone Ltd., Wiarton Quarry, Amabel Tp.	dolostone
24. Cut Above Natural Stone, Cut Above Natural Stone Quarry, Rama Tp.	limestone
25. Deforest Brothers Quarry Ltd., Deforest Brothers Quarry, Caledon Tp.	sandstone
26. Dufferin Aggregates, Flamborough Quarry, West Flamborough Tp.	dolostone
27. Ebel Quarries Inc., Ebel Quarry, Amabel Tp.	dolostone
28. Ebel Quarries Inc., Arnold Property Quarry, Amabel Tp.	dolostone
29. Eisen Quarries Inc., Wiarton Quarry, Amabel Tp.	dolostone
30. Georgian Bay Marble and Stone, Cook Quarry, Amabel Tp.	dolostone
31. Hilltop Stone and Supply Inc., Hilltop Quarry, Esquesing Tp.	sandstone
32. International Fixture Installations Inc., Amabel Tp. (operated by Amsen Quarries Ltd.)	dolostone
33. James Lamb, Rama Tp.	dolostone
34. Limberlost Stone Inc., Limberlost Quarry, Albemarle Tp.	dolostone
35. MAQ Aggregates, Hewitt Property Quarry, Orillia Tp. (operated by Gott Natural Stone '99 Inc.)	limestone
36. Owen Sound Ledgerock Ltd., Senesun Quarry, Amabel Tp.	dolostone
37. Owen Sound Ledgerock Ltd., Wiarton Quarry, Amabel Tp.	dolostone
38. Owen Sound Ledgerock Ltd., Owen Sound Quarry, Keppel Tp.	dolostone
39. Owen Sound Ledgerock Ltd., Hope Bay Quarry, Albemarle Tp.	dolostone
40. Rama Stone Quarries Ltd., Fleming Quarry, Rama Tp. (operated by Fowler Construction)	gneiss
41. Rice and McHarg Ltd., Rice and McHarg Quarry, Esquesing Tp.	sandstone
42. Rockleith Quarry Ltd., Rockleith Quarry, Orillia Tp.	limestone
43. Speiran Quarries Ltd., Speiran Quarry, Rama Tp. (operated by Gott Natural Stone '99 Inc.)	limestone
44. Stone Cottage Inn Ltd., Attia/Rama Quarry, Rama Tp.	dolostone
45. Wiarton Stone Quarry Inc., Wiarton Stone Quarry, Amabel Tp.	dolostone

⬡ **Producing Brine Well Fields – Salt**

46. Sifto Canada Inc., Goderich Brine Field, Goderich	salt in brine
47. The Canadian Salt Company Ltd., Windsor Brine Field, Windsor	salt in brine

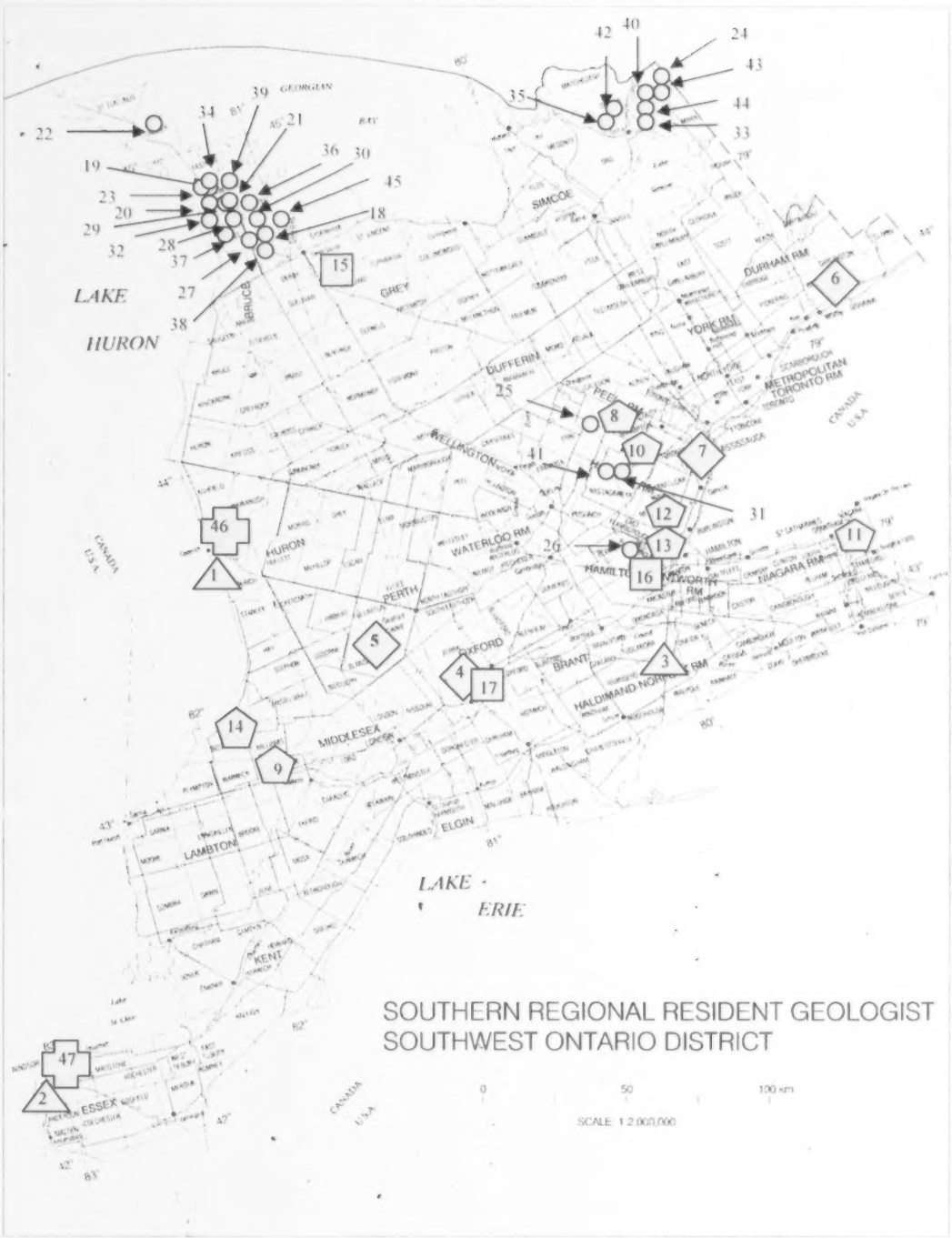

Figure 1. Producing mines and quarries–Southwest Ontario District, 2005

Table 1. Selected industrial mineral and fuel production in Ontario.

	2002 Quantity Thousands tonnes	2002 Value Thousands $	2003 Quantity Thousands tonnes	2003 Value Thousands $	2004 P Quantity Thousands tonnes	2004 P Value Thousands $
Non-metals						
Gypsum (1)	879	16 174	877	19 442	735	14 053
Salt (1)	7 630	262 429	8 697	253 479	8 646	258 401
Structural Materials						
Clay products (2)	N/A	191 140	N/A	192 537	N/A	192 687
Cement (4)	6 267	613 485	6 392	621 647	6 793	658 921
Lime (2)	1 122	103 205	1 032	105 122	1 246	132 340
Sand and Gravel (3)	95 464	405 317	98 726	437 893	102 204	456 736
Stone* (3)	55 945	504 246	54 622	512 298	57 093	562 870
Total, Industrial Minerals (Non-metals)		**2 249 939**		**2 301 993**		**2 446 896**
	Quantity Thousands 1000 m^3	**Value Thousands $**	**Quantity Thousands 1000 m^3**	**Value Thousands $**	**Quantity Thousands 1000 m^3**	**Value Thousands $**
Fuels						
Natural Gas (1)	355	51 105	377	112 500	377	114 700
Petroleum (1)	214	55 165	186	50 200	153	51 700
Total, Fuels		**106 270**		**162 700**		**166 400**

(1) all production from Southwest Ontario District
(2) 95% production from Southwest Ontario District
(3) >75% production from Southwest Ontario District
(4) 70% production from Southwest Ontario District

p preliminary data
N/A data not available
* production represents quarry shipments of crude or undressed stone, crushed stone and dressed stone, if the latter is prepared by the quarry operators, at values as reported by operators – this category includes crushed rock aggregate, trap rock, specialty aggregate, dimension stone and calcium carbonate

after Ontario Mineral and Exploration Statistics 2004, MNDM 2005.

Table 2. Salt and gypsum mine production and reserves in the Southwest Ontario District.

Mine	2005 Production Tonnage @ Grade	2004 Production Tonnage @ Grade	2003 Production Tonnage @ Grade	2002 Production Tonnage @ Grade	2001 Production Tonnage @ Grade	Reserves at end of 2005 Tonnage @ Grade
Caledonia No. 3 Mine (mine closed May 2004)		64 135 t @ <75% gypsum	271 376 t @ 75-80% gypsum	274 264 t @ 75-80% gypsum	272 240 t @ 75-80% gypsum	38 000 000 t @ 70-75% gypsum
Hagersville Mine	700 000 t @ 85% gypsum	700 000 t @ 85% gypsum	700 000 t @ 85% gypsum	690 000 t @ 85% gypsum	700 000 t @ 85% gypsum	10 500 000 t @ 85% gypsum
Goderich Mine	6 580 000 t @ 97% NaCl	6 270 000 t @ 97% NaCl	6 008 000 t @ 97% NaCl	5 082 000 t @ 97% NaCl	6 002 000 t @ 97% NaCl	331 000 000 t @ 97% NaCl
Ojibway Mine	2 410 000 t @ 97% NaCl	2 680 000 t @ 97% NaCl	2 712 000 t @ 97% NaCl	2 302 000 t @ 97% NaCl	2 600 000 t @ 97% NaCl	76 500 000 t @ 97% NaCl

Table 3. Property visits conducted by the Southwest Ontario District geologists in 2005.

Property/Occurrence/Plant/Site	Location	Commodity
St. Marys Cement Inc. – Bowmanville quarry & plant	Darlington Tp.	Cement
Evergreen project site – Don Valley Brickworks	Toronto	Shale/Brick rehabilitation
Owen Sound Ledgerock Ltd. – Owen Sound quarry & plant	Keppel Tp.	Marble/dolostone/dimension stone
Owen Sound Ledgerock Ltd. – Hope Bay Quarry	Albemarle Tp.	Marble/dolostone/dimension stone
Hanson Canada Brick - Aldershot shale quarry and brick plant	Burlington	Shale/brick
Rice & McHarg Quarries Ltd. Quarry	Esquesing Tp.	Sandstone/building stone
Limberlost Stone Inc. – Limberlost Quarry	Albemarle Tp.	Marble/dolostone/dimension stone
Carmeuse Lime Canada – Beachville operations	Zorra Tp.	Limestone/lime
Lafarge Canada Inc. – Coldwater Quarry	Tay Tp.	Limestone/aggregate
Gott Natural Stone '99 Inc – Hewitt Quarry	Orillia Tp.	Limestone/dimension stone
The Canadian Salt Company Ltd. – Ojibway Mine	Windsor	Rock salt
Rocklieth Quarry Ltd. – Rockleith Quarry	Orillia Tp.	Limestone/dimension stone
Nelson Aggregate Co. – Uhtoff Quarry	Orillia Tp.	Limestione/aggregate
Fowler Construction Co. – Rosewarne Quarry	Bracebridge	Gneiss/aggregate
Speiran Quarries – Speiran Quarry	Rama Tp.	Limestone/dimension stone
OMYA Canada Inc. – Tatlock Quarry & Perth Plant	Tatlock Tp.	Calcium Carbonate
Bruce Peninsula Stone – Wiarton Quarry	Amabel Tp.	Dolostone/dimension stone

Table 4. Newsletters received by the MMIC library in 2005.

Title
Alaska GeoSurvey News - Newsletter, Alaska Division of Geological & Geophysical Surveys
Canadian Copper - Canadian Copper & Brass Development Association
ICMM Newsletter - International Council on Mining and Metals
Nova Scotia Minerals Update - Nova Scotia Natural Resources
Ohio Geology - Ohio Department of Natural Resources
Ontario Petroleum Institute - Newsletter
PDAC in Brief – Prospectors and Developers Association of Canada
Pennsylvania Geology – Pennsylvania Department of Conservation and Natural Resources
R & D - Research and Development at the Alberta Research Council
Rock Chips - Alberta Geological Survey
Safety Focus - Mines and Aggregates Safety and Health Association
The Explorationist – Newsletter of the Ontario Prospectors Association
The Gangue – GAC Mineral Deposits Division Newsletter
What on Earth - University of Waterloo Department of Earth Sciences

Table 5. Journals and periodicals received by the MMIC library in 2005.

Title
Aggregates & Roadbuilding
American Association of Petroleum Geologists (AAPG) Bulletin
Canadian Journal of Earth Sciences
Canadian Geotechnical Journal
Canadian Mining Journal
Canadian Mining and Metallurgical Bulletin - Canadian Institute of Mining, Metallurgy and Petroleum
Economic Geology – Bulletin of the Society of Economic Geologists
Engineering and Mining Journal
Geoscience Canada
Industrial Minerals
Northern Miner
On Nature – Ontario Nature Magazine of the Federation of Ontario Naturalists
Pit & Quarry
Stone World
The Canadian Mineralogist - Mineralogical Association of Canada
The Ontario Prospector

Table 6. Geological Survey of Canada publications incorporated into the MMIC library during 2005.

Title	Author	Type and Year of Publication
Bells Corners Calibration Facilities for Downhole and Surface Geophysical Equipment	Mwenifumbo, C.J., Elliott, B.E., Hyatt, W.G. and Bernius, G.R.	Open File 4838, 17p., 2005
Regional 3-D Structural Model of the Oak Ridges Moraine and Greater Toronto Area, Southern Ontario: Version 2.0	Logan, C., Russell, H.A.J. and Sharpe, D.R.	Open File 4957, 1 CD-ROM, 2005
Surficial Geology, Ice Flow Indicators for the New Liskeard-Temagami Area Ontario	McClenaghan, M.B. and Veillette, J.J.	Open File 3385, 1 CD-ROM, 2001
Lake Sediment Erosional Unconformities and Possible Lowered Lake Level at 7.6 14C ka in the Lake Simcoe Basin, Ontario	Todd, B.J., Lewis, C.F.M. and Anderson, T.W.	Open File 4967, 1 Poster, 2005
Geology, Sturgeon Lake Greenstone Belt, Western Superior Province, Ontario	Sanborn-Barrie, M. and Skulski, T.	Open File 1763, 1 Colour Map / 1 CD-ROM, Scale 1:100 000, 2005
Geology, Sudbury Bedrock Compilation, Ontario	Ames, D.E., Davidson, A., Buckle, J.L. and Card, K.D.	Open File 4570, 1 Colour Map, Scale 1:50 000, 2005
GIS Compilation of Geology and Tectonostratigraphic Assemblages, Wabigoon–Winnipeg River--Marmion Transect, Western Superior Province, Ontario	Lemkow, D.R., Sanborn-Barrie, M. Stott, G.M., Percival, J.A., Stone, D., Tomlinson, K.Y., Skulski, T., McNicoll, V., Davis, D.W., Whalen, J.B. and Hollings, P.	Open File 4971, 1 CD-ROM, 205
Regional 3-D Structural Model of the Oak Ridges Moraine and Greater Toronto Area, Southern Ontario: Version 2.1	Logan, C., Russell, H.A.J. and Sharpe, D.R.	Open File 5062, 1 CD-ROM, 2005
Structural Model of the Greater Toronto and Oak Ridges Moraine Areas, Southern Ontario: Halton Till	Russell, H.A.J., Sharpe, D.R. and Logan, C.	Open File 5064, 1 Sheet, Scale 1:250 000; 2005
Structural Model of the Greater Toronto and Oak Ridges Moraine Areas, Southern Ontario: ORM Sediment	Russell, H.A.J., Sharpe, D.R. and Logan, C.	Open File 5065, 1 Sheet, Scale 1:250 000, 2005
Structural Model of the Greater Toronto and Oak Ridges Moraine Areas, Southern Ontario: Newmarket Till	Sharpe, D.R., Russell, H.A.J. and Logan, C.	Open File 5066, 1 Sheet, Scale 1:250 000, 2005
Structural Model of the Greater Toronto and Oak Ridges Moraine Areas, Southern Ontario: Lower Sediment	Sharpe, D.R., Russell, H.A.J. and Logan, C.	Open File 5067, 1 Sheet, Scale 1:250 000, 2005.
The Buried Laurentian Valley, Southern Ontario: Character, Sedimentary Fill, and Hydrogeological Setting in the Nobleton – King City Area	Sharpe, D.R., Russell, H.A.J., Pullan, S.E. and Hunter, J.A.	Open File 5068, 1 Sheet, 2005

Table 7. Selected Ontario Geological Survey publications received by MMIC library in 2005, with particular interest to southern Ontario.

Title	Author	Type and Year of Publication
Ontario Geochemistry and Indicator Mineral Database	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release–Data 153, 1 DVD, 2005
Report of Activities 2004, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Ontario Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre	Sangster, P.J., Papertzian, V.C., Steele, K.G., Lee, C.R., Barua, M., Laidlaw, D.A., and Carter, T.R.	Ontario Geological Survey, Open File Report 6152, 77p., 2005
Report of Activities 2004, Resident Geologist Program, Regional Land Use Geologist Report: Northwestern, Northeastern and Southern Ontario Regions	Debicki, R.L., Drost, A.P., Lichtblau, A.F., Fraser, R.J. and Rowell, D.J.	Ontario Geological Survey, Open File Report 6153, 37p., 2005.
Quaternary Geology of the Brampton Area	Karrow, P.F.	Ontario Geological Survey, Report 257, 59p., 2005. Accompanied by Map 2223
Three Dimensional Surficial Geochemistry	Canadian Mining Industry Research Organization (CAMIRO)	Ontario Geological Survey, Miscellaneous Release–Data 164, 1 CD-ROM, 2005
Geochemical Detection of Disseminated Palladium Mineralization in Ontario	University of Ottawa	Ontario Geological Survey, Miscellaneous Release–Data 170, 1 CD-ROM, 2005
Application of a Geodata Analysis System (GeoDAS) to Mineral Exploration in Ontario	York University and Geological Survey of Canada	Ontario Geological Survey, Miscellaneous Release–Data 171, 1 CD-ROM, 2005
Development of Methods and Technology for the Discovery of New Resources Around Existing Mine Infrastructure	Mira Geoscience Limited	Ontario Geological Survey, Miscellaneous Release–Data 172, 1 CD-ROM, 2005
Downhole Seismic Imaging Method: A New Tool for Deep Mineral Exploration	Mira Geoscience Limited	Ontario Geological Survey, Miscellaneous Release–Data 175, 1 CD-ROM, 2005
Development and Demonstration of Novel Field-Portable Sample Preparation Methods for On-Site Geochemical Analysis	Gedex Inc.	Ontario Geological Survey, Miscellaneous Release–Data 176, 1 CD-ROM, 2005
Development of a Relational Physical Rock Property Database	Mira Geoscience Limited, McMaster University and Geological Survey of Canada	Ontario Geological Survey, Miscellaneous Release–Data 179, 1 CD-ROM, 2005
Summary of Field Work and Other Activities 2005	Baker, C.L., Debicki, E.J., Kelly, R.I., Ayer, J.A., Easton, R.M. and Madon, Z.B. (eds.)	Ontario Geological Survey, Open File Report 6172, 1 vol., 2005
Modelling, Interpretation Methods and Field Trials of an Existing Prototype Audio Frequency Magnetics (AFMAG) System	Geotech Ltd.	Ontario Geological Survey, Miscellaneous Release–Data 167, 1 CD-ROM, 2005
Detectability of Mineral Deposits With Potential Field Methods	Mira Geoscience Limited	Ontario Geological Survey, Miscellaneous Release–Data 177, 1 DVD, 2005
Development and Evaluation of a 3D Vector Orientation Software Illustrated With Triaxial Gradient Magnetic Data	Bedrock Research Corp.	Ontario Geological Survey, Miscellaneous Release–Data 178, 1 CD-ROM, 2005
Detectability of Mineral Deposits With Electrical Resistivity and Induced Polarization Methods	Mira Geoscience Limited	Ontario Geological Survey, Miscellaneous Release–Data 181, 1 CD-ROM, 2005
Mineral Exploration by Systematic Analysis of Groundwater Upwelling in Lakes and Rivers	Aquapath Canada Limited	Ontario Geological Survey, Miscellaneous Release–Data 182, 1 CD-ROM, 2005
Ontario Drill Hole Database—December 2005 Release	Ontario Geological Survey	Ontario Geological Survey, Data Set 13—Revision 1, 1 CD-ROM, 2005
A New Aircraft Compensation System for Magnetic Terrains	Lo, B. and PetRos EiKon Inc.	Ontario Geological Survey, Miscellaneous Release–Data 185, 1 CD-ROM, 2005

Table 8. Selected new reference publications received by the MMIC library in 2005.

Title	Author	Type and Year of Publication
Ontario Mining and Exploration Directory 2005	Viegas-Monchamp, T. (ed.)	Directory, Naylor Publications Company (Canada), Winnipeg Manitoba, 50p., 2005
Mines and Wines – Industrial Minerals, Geology and Wineries of the Niagara Peninsula	Steele, K.	Field Trip Guide Book, Canadian Institute of Mining, Metallurgy and Petroleum (CIM) – Toronto Branch and Industrial Minerals Division, 28p., 2004
Platinum 2005	Kendall, T.	Platinum Report, Johnson Matthey Public Limited Company, London England, 52p., 2005
37th Forum on the Geology of Industrial Minerals with emphasis on Western North America	Simandl, G.J., McMillan, W.J. and Robinson, N.D. (eds.)	Industrial Minerals Proceedings, BC Ministry of Energy and Mines, Geological Survey Branch, Victoria, 319p., 2004
Rockwatching : Adventures Above and Below Ontario	Gordon, M.	Guidebook, Boston Mills Press, Erin Ontario, 192p., 2005
Canadian & American Mines Handbook 2005-2006	Giancola, D. (ed.)	Business Information Group, Toronto, 624p., 2005
Platinum 2005 Interim Review	Kendall, T.	Platinum Report, Johnson Matthey Public Limited Company, London England, 28p., 2005
2005/06 CAMESE Compendium of Canadian Mining Suppliers	Canadian Association of Mining Equipment and Services for Export	The Canadian Association of Mining Equipment and Services for Export, Markham Ontario, 154p., 2005
The Economic and Fiscal Contribution of the Mining Industry in Ontario	Ontario Mining Association	Final Report, 2004
Greenbelt Plan 2005	Ministry of Municipal Affairs and Housing	Final Report, 2005
Facts & Figures / 2003	Mining Association of Canada	Report, 2003
A Rockhound's Paradise I Bancroft and Region	Trueman, B.	Compilation, W.W.E.C., Toronto, 1 vol., 1998
Aggregate and the Environment	Langer, W.H., Drew, L.J. and Sachs, J.S.	American Geological Institute, AGI Environmental Awareness Series, Alexandria Virginia, 64p., 2004
Nonferrous Metals Outlook December 2004	Minerals and Metals Sector Natural Resources Canada	Outlook Report, Natural Resources Canada, Ottawa, 42p., 2005
Towards Sustainable Mining Progress Report 2004	The Mining Association of Canada	Progress Report, 2004
A Guide to the Geology and Landforms of Grey and Bruce Counties	The Bruce-Grey Geology Committee	Guide Book, The Owen Sound Field Naturalists, 142p., 2004

Table 9. Mineral deposits not being mined in the Southwest Ontario District in 2005

Abbreviations

AF.....Assessment Files
CMH.....Canadian Mines Handbook
GR.....Geological Report
MDC.....Mineral Deposit Circular
MDIR.....Mineral Deposit Inventory Record
MLS.....Mining Lands, Sudbury
MR.....Mining Recorder
NM.....The Northern Miner
OFR.....Open File Report
PC.....Personal Communication

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Amherstburg Quarry silica prospect (40J/03SE)	Silica	20 m thick over 66 ha (20-26 by 10^6 t @ 94% SiO_2)	Amherst Quarries (1969) Ltd.	OFR 5861, p.32 IMR 9, p.29, 31	Inactive
Big Creek 1 (40J/03SE)	Silica	19.5 m thick @ 25 m (10 by 10^6 t of sandstone)	N/A	IMR 9, p.29	Inactive
Big Creek 1 (40J/03SE)	Silica	14.6 m thick @ 34.4 m (10 by 10^6 t of sandstone)	N/A	IMR 9, p.29	Inactive
Dow-Moore 2-20-12 (40J/16NW)	Salt	21 m thick @ 698 m 73 m thick @ 582 m 114 m thick @ 410 m	N/A	PRW Dow-Moore 2-20-XII	Inactive
Eastnor–Lindsay prospect (41H/03SW)	Dolomite	60 by 10^6 t dolomite @ <0.10% impurities (SiO_2+Fe_2O_3+Al_2O_3)	N/A	PRW OGS Lindsay 7-III W	Inactive
Imperial Oil No.560, Sombra 2-12-H, Gormlay No. 1 (40J/090NW)	Salt	32.2 m thick @ 612.6 m 84.1 m thick @ 490.7 m 46.9 m thick @ 388.6 m	N/A	PRW Sombra 2-12-H	Inactive
Imperial Oil No.597, Logierait No.1-Y-R, R.C. Fleck No. 2B (40J/16NW)	Salt	29.6 m thick @ 680 m 87.8 m thick @ 544 m	N/A	PRW Imperial Oil No. 597B	Inactive
Lindsay prospect (41H/03SW)	Dolomite	>35 by 10^6 t dolomite @ <0.10% impurities (SiO_2+Fe_2O_3+Al_2O_3)	N/A	PRW OGS Lindsay 31-VIII W	Inactive
Patton Farm (40J/03SE)	Silica	5.4 m thick @ 10.1 m	N/A	IMR 9, p.29	Inactive
Sunburst GB #7 McGillivray 41-NB (40P/04NE)	Salt	88.7 m thick @ 363.6 m 5.8 m thick @ 339.5 m	N/A	PRW Sunburst GB #7	Inactive
Tobermory prospect (41H/04NE)	Dolomite	60 by 10^6 t dolomite @ <0.10 impurities (SiO_2+Fe_2O_3+Al_2O_3)	N/A	PRW OGS St. Edmunds 47-III W	Inactive
Union Gas-Enniskillen No. 29, D.V.L.A. No. 1 (40J/16SW)	Salt	25.6 m thick @ 610.8 m 78.6 m thick @ 485.5 m	N/A	PRW Union Gas-Enniskillen No. 29	Inactive
Union Gas-Moore No. 12 P&I Williams No. 1 (40J/16SW)	Salt	26.2 m thick @ 577.3 m 70.7 m thick @ 456.6 m	N/A	PRW Union Gas-Moore No. 12- P&I Williams No. 1	Inactive
Union –Moore No. 22 (40J/16SW)	Salt	36 m thick @ 580 m 32 m thick @ 437 m	N/A	PRW Union Moore No. 22	Inactive

Note: The resource estimates listed in this table are historic figures generated by past workers and do not follow the required disclosure for reserves and resources as outlined in National Instrument 43-101.

Ontario

Ontario Geological Survey
Regional Resident Geologist Program

Petroleum Resources Centre—2005

by

T.R. Carter

2006

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Petroleum Resources Centre—2005

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Petroleum Resources Centre—2005

Oil and Gas Exploration and Development Activity in Ontario in 2005

T.R. Carter

Subsurface Geologist, Petroleum Resources Centre, Ministry of Natural Resources, London

INTRODUCTION

Drilling activity in Ontario continued at the relatively low levels experienced in 2004. World oil prices were strong throughout the year due to continuing concerns about world oil supplies, political instability in major petroleum producing regions in the Middle East and Africa, supply disruptions in the Gulf of Mexico due to hurricane damage to production facilities, low inventory levels of refined petroleum products in the United States, and strong demand growth in China. Natural gas prices remained at higher levels than long-term averages as in 2004 despite healthy inventories of natural gas in storage reservoirs.

Despite high commodity prices drilling and production activities in Ontario continued at historically low levels. Preliminary production figures compiled from annual production reports submitted to the Petroleum Resources Centre indicate annual oil production declined 10% to 137,640 m^3 in 2005, compared to 153,048 m^3 the previous year. Production of natural gas totalled approximately 347,150 10^3 m^3 compared to 359,448 10^3 m^3 the previous year. These declines are directly related to reduced levels of drilling activity both in 2004 and 2005 such that there is insufficient new production to replace reserves produced from existing wells.

EXPLORATION ACTIVITY

A total of 92 licences to drill and operate new wells were issued by the Ministry of Natural Resources in 2005, compared to 89 in 2004. An additional 15 licences were issued for plugging of orphan wells, 60 existing wells were licensed for oil production from historical oil fields and 10 existing wells were licensed for production as private gas wells. At the time of writing, drilling of new wells was reported to be complete at 76 wells consisting of 16 exploratory wells, 48 development wells; and 12 service wells. Horizontal drilling accounted for only 7 of the wells drilled in 2005. The 2005 exploratory drilling resulted in 5 wells reported as gas producers (Table 1, Figure 1) with no wells completed for production of oil. Development drilling was very successful with 8 wells reported to be oil producers, 22 as gas producers, and 6 as private gas wells. Successful oil wells were completed in Ordovician targets, while completions in Silurian sandstone reservoirs in Norfolk; Haldimand and Elgin counties and offshore Lake Erie dominated the gas-producing wells. Of the 23 wells drilled offshore Lake Erie in 2005, 17 wells were reported as gas producers.

Talisman Energy Inc. was the most active exploration company in Ontario's petroleum industry in 2005, with 30 wells drilled.

Cambrian Play

Two exploratory wells were drilled to test Cambrian targets for oil and natural gas potential in 2005. Metalore reported that Metalore Song No.9, Houghton 4-5-V was completed as a gas producer in a new pool discovery.

Ordovician Play

Drilling was reported to be complete at 1 exploratory well and 7 development wells testing Ordovician targets in 2005. In exploratory drilling GGOL #69 Blenheim 2-19-XI was reported by Greentree Gas & Oil as a potential gas producer. The Ordovician development drilling resulted in 7 new oil producers for Talisman Energy. Successful oil wells were completed in the Rochester 5-12-IV EBR, Mersea 3-4-IV, Mersea 3-6-V, and Gosfield North 2-21-VI

pools. All seven of these wells were drilled horizontally in the reservoirs.

Silurian Sandstone Play

The interest in Silurian sandstone targets continued in 2005 in response to high natural gas prices. A total of 9 exploratory and 37 development wells tested Lower Silurian sandstone targets in 2005. Five of the exploratory wells, including one private gas well, were completed as gas producers in exploratory extensions of known pools.

All thirty-seven development wells were reported as active or potential gas producers. Successful gas wells were drilled in 4 different pools: Bayham, Houghton 5-8-ENR, Welland and the Lake Erie–Maitland pool. Six of the 37 wells were completed as private gas wells in parts of the Lincoln, Welland, and Haldimand gas fields.

Silurian Carbonate Play

There were 3 exploratory tests of Silurian Guelph Formation reef and/or Salina Formation structural trap targets in 2005. All of these wells were plugged and abandoned shortly after drilling.

There were 4 development tests of Silurian Guelph–Salina targets in 2005. Reef Resources completed one well as a oil and gas producer in the Stephen 4-10-XXII gas pool, and Talisman reported 1 well as a gas producer in the Lake Erie Silver Creek pool.

Devonian Play

One exploratory well was drilled to test Devonian targets and was plugged and abandoned shortly after drilling.

RECOMMENDATIONS FOR EXPLORATION

Recommendations for exploration are unchanged from last year. Ordovician reservoirs are still the focus of exploration directed at discovery or development of oil reservoirs. Exploration for new pools has declined in this play in the past four years with a focus on extension or development drilling of known trends. Essex County and southern Kent County are still the most attractive onshore locations but exploration will have to expand to the north and east if oil production is to be maintained. There is considerable remaining untested potential for natural gas in this play beneath the eastern basin of Lake Erie and onshore east and north from Kent County to the Niagara Escarpment. A recent reassessment of potential in this play by the Ministry of Natural Resources indicates potential remaining undiscovered resources totalling 201 billion cubic feet (Bcf) of natural gas and 16.6 million barrels of oil. There also may be potential for trapping of natural gas in sandy facies of the Ordovician Shadow Lake Formation over the crest of the Algonquin Arch.

If natural gas prices remain high, the economics of all the gas plays in Ontario are greatly enhanced. There has already been an increase in drilling in the Lower Silurian sandstone play both onshore and offshore, and the platform reef play. There is potential for discovery of Cambrian gas or oil pools along the pinch-out edge of the Cambrian sandstone in the subsurface, or in fault-controlled structures. There may be considerable unrealised potential in fault-related structural traps in the Salina A-1 and A-2 Carbonate units in Kent, Elgin and Middlesex counties. There is also conceptual potential for a new unconventional gas play in the black shales of the Kettle Point Formation, analogous to the very successful Antrim shale play in Michigan and the Ohio shales in Ohio. Shows of natural gas have been reported in the Kettle Point Formation in Ontario but it has never been targeted for exploration and no scientific studies of its potential have been completed.

Table 1. Successful exploratory wells in southwestern Ontario, 2005. See Figure 1 for well locations.

Well #	Well Name	Results	Target	TD	Latitude	Longitude	TD Date
1	Metalore Song No 9, Houghton 4- 5 - V	GP - ACT	CAM	1142.3	42.61962222	-80.62071389	2005-10-25
2	Echo 49, Bayham 8 - 8 - II	GP - CAP	CLI	433.5	42.67159722	-80.82335556	2005-01-10
3	Echo 55, Bayham 7 - 2 - III	GP - CAP	CLI	441.0	42.69298611	-80.85186667	2005-07-26
4	TLM East, Lake Erie 86 - 11 - 2	GP - ACT	CLI	518.0	42.56533333	-79.79620000	2005-08-20
5	Metalore No. 91, Charlotteville 14 - 4 - A	GP - ACT	CLI	394.5	42.66995556	-80.38749444	2005-12-19

Notes:

ACT -Active
CAP -Capped
CAM -Cambrian
CLI -Silurian Clinton–Cataract
GP -Gas Producer
TD -Target Depth in metres

Figure 1. Successful exploratory wells in Ontario in 2005

Metric Conversion Table

Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	*Multiplied by*	*Gives*	*Imperial Unit*	*Multiplied by*	*Gives*
		LENGTH			
1 mm	0.039 37	inches	1 inch	**25.4**	mm
1 cm	0.393 70	inches	1 inch	**2.54**	cm
1 m	3.280 84	feet	1 foot	**0.304 8**	m
1 m	0.049 709	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	**1.609 344**	km
		AREA			
1 cm^2	0.155 0	square inches	1 square inch	**6.451 6**	cm^2
1 m^2	10.763 9	square feet	1 square foot	**0.092 903 04**	m^2
1 km^2	0.386 10	square miles	1 square mile	2.589 988	km^2
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
		VOLUME			
1 cm^3	0.061 023	cubic inches	1 cubic inch	**16.387 064**	cm^3
1 m^3	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m^3
1 m^3	1.307 951	cubic yards	1 cubic yard	0.764 554 86	m^3
		CAPACITY			
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	**4.546 090**	L
		MASS			
1 g	0.035 273 962	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 747	ounces (troy)	1 ounce (troy)	**31.103 476 8**	g
1 kg	2.204 622 6	pounds (avdp)	1 pound (avdp)	**0.453 592 37**	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	**907.184 74**	kg
1 t	1.102 311 3	tons (short)	1 ton (short)	**0.907 184 74**	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	**1016.046 908 8**	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	**1.016 046 90**	t
		CONCENTRATION			
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

	Multiplied by	
1 ounce (troy) per ton (short)	31.103 477	grams per ton (short)
1 gram per ton (short)	0.032 151	ounces (troy) per ton (short)
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.

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